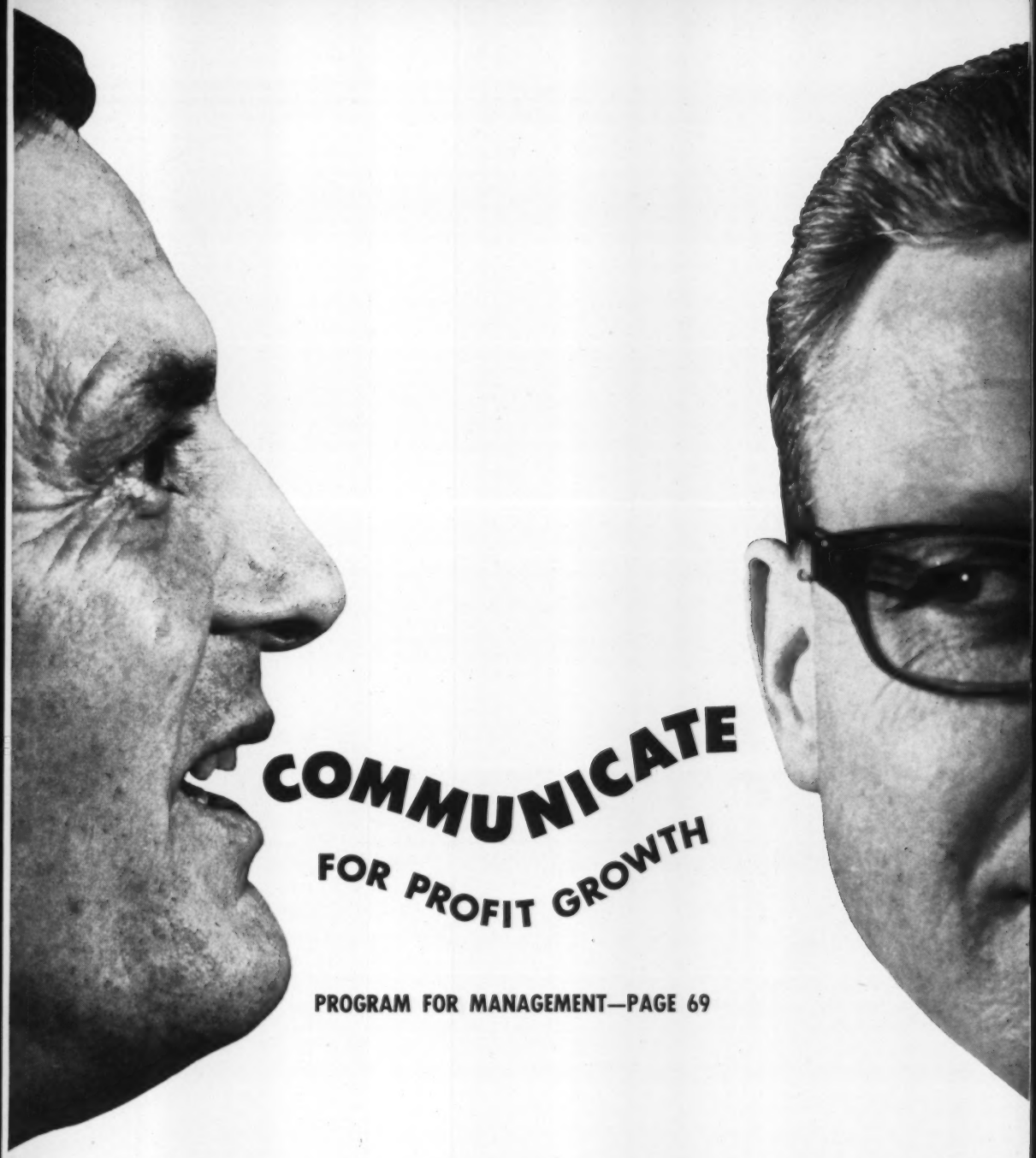
STEEL
The Metalworking Weekly
A PENTON PUBLICATION
NOVEMBER 20, 1961



COMMUNICATE FOR PROFIT GROWTH

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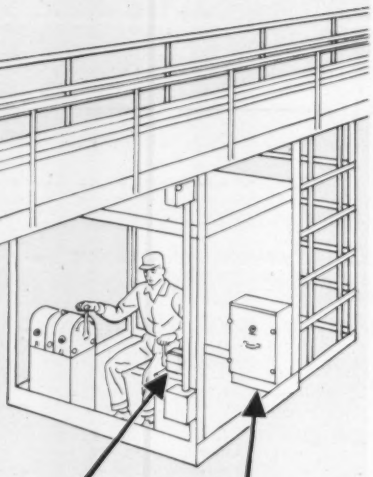
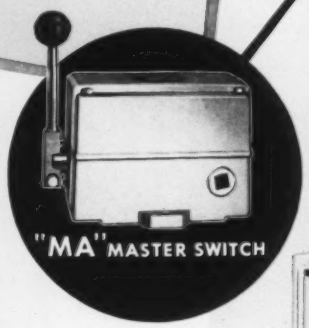
Better than Manual Control for So Many Reasons!

NEW LOW COST EC&M MAGNETIC CONTROL FOR DC CRANES



Now, on any DC application up to 55 HP, 230 volts, you can have the advantage of full *magnetic* control where manual control formerly was specified purely on the basis of price. At comparable cost, EC&M's new *Type PT* Magnetic Control gives you—



Compactness—fits easily in crane cabs, on crane walkways and wherever space is limited.

3-point or 4-point Speed Control

Reduced Motor Wear through automatic acceleration. Acceleration relays adjustable from a minimum of 0.2 second up, per step.

Space Saving—front connection permits mounting against wall.

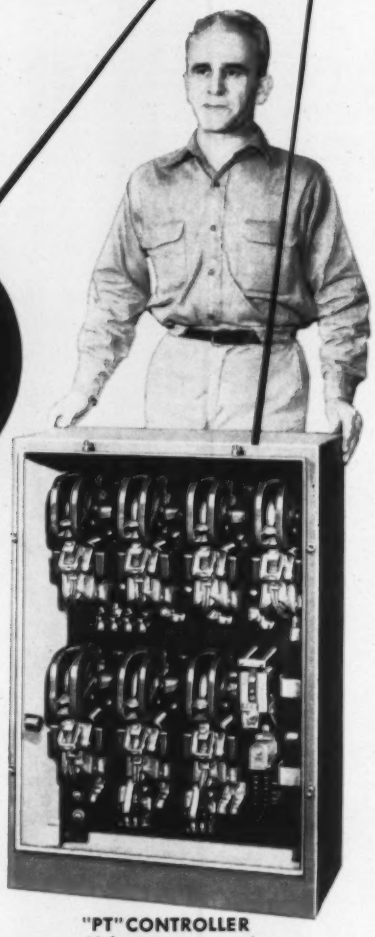
Hi-Speed Lowering with 4-point hoist control.

Fewer Spares—no manual control parts to stock.

Choice of Mounting Arrangements—MA Master Switch can be ganged with other masters or self-contained on top of the PT Controller.

Standardized Overload Protection is available. Separate panel for protection of 1 to 4 motors is smaller, simpler than protective panels used with manual controllers.

Write FOR BULLETIN 6131



"PT" CONTROLLER
with front cover removed

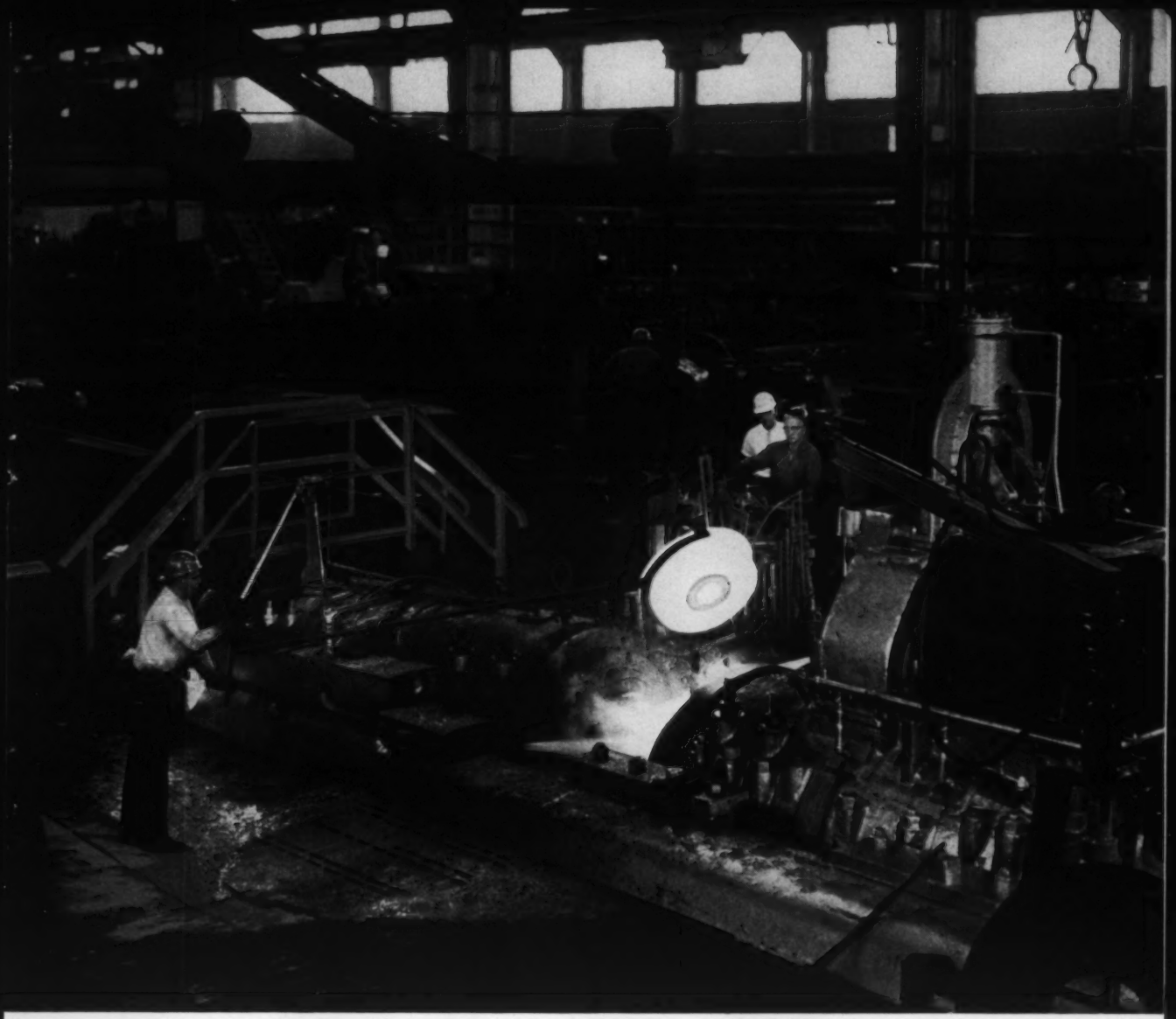
Available for Hoist, Bridge and Trolley motions on cab or floor-operated cranes

SQUARE D COMPANY

EC&M DIVISION • CLEVELAND 28, OHIO

wherever electricity is distributed and controlled

7418



Bethlehem's unique Slick Mill, named after its inventor, forges and rolls a circular forging—100 to 2,000 lb—in one minute.

SLICK

This is our Slick mill. It's the only one of its kind. It turns out a circular forging—gear blank, sheave wheel, compressor wheel, tire mold, or crane wheel—*in less than one minute.*

Thanks to quick die changes, it handles production runs as small as 25 to 50 pieces almost as economically as runs ten times as large.

It cuts conventional die charges in half because contact between die and work is so brief.

It produces light-weight sections without sacrificing strength . . . forgings with excellent grain flow, machinability, and soundness.

It's a pretty slick mill.

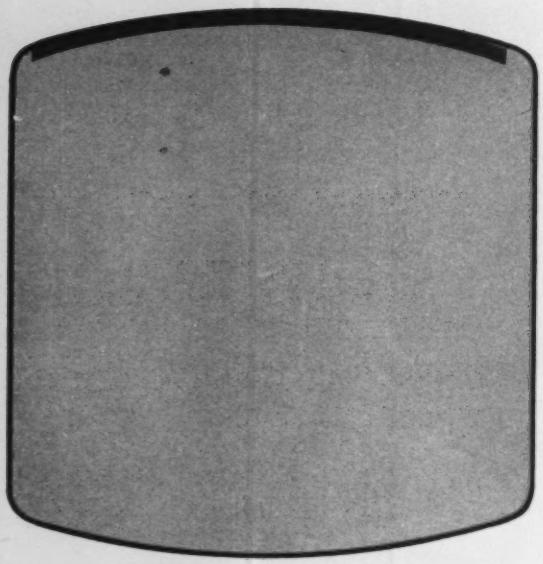
But that's not why it's *called* a Slick Mill. Edwin E. Slick is the name of the man who invented this unique mill. If you'd like to know more about how it can help you cut the cost of circular products, ask our nearest sales office. Or write to us at Bethlehem, Pa.

Steel *for Strength ... Economy ... Versatility*

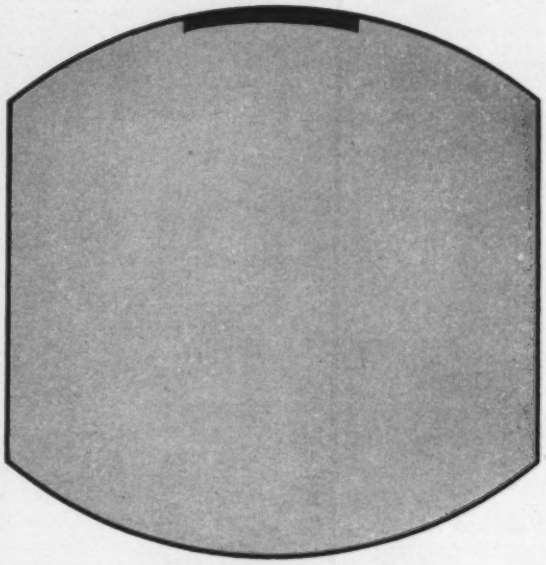
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



NEW: Now, SKF's improved "C" type design extends contact area over the entire length of a longer roller element.



OLD: In older flanged type bearings, effective contact area was no longer than the red line.

CAPACITY:

SKF's new "C" type bearing increases capacity as much as 54% by giving the roller some growing space.

The space was always there, but, until the SKF "C" type bearing, it was occupied by undercuts and fixed flanges. SKF removed them so the roller could be lengthened over a wider raceway.

Result: *The SKF "C" type bearing increases capacity up to 54%—corresponding to more than 4 times longer service life.*

SKF PUT THE GREATER LENGTH TO WORK. Length alone is not enough. It's only the raw potential for greater load-carrying capacity. A high capacity bearing has to be designed to *realize* that potential. Here's how the "C" type does it:

- CLOSE OSCULATION, that is close conformity between rings and rollers, distributes load evenly over the *entire* length of the roller.
- AN AXIALLY FLOATING FLANGE, combined with the symmetrical roller, assures automatic and *even* distribution of load under any combination of radial and thrust loads.

See for yourself! Ask your SKF man to show you his desk top demonstration of the new "C" type bearing. 6127

SKF MOTION ENGINEERING

Advanced ball and roller bearing technology

You can do more jobs more profitably with a PACIFIC

...another case in point!

PACIFIC HYDRAULIC ...the versatile shear that cuts heavy plate or tissue-thin metal within thousandths of inch

Pacific Hydraulic is a general purpose shear handling a complete range of metal thicknesses within capacity. With both the knife clearance and the rake angle quickly and easily adjustable, the shear can be used alternately for heavy duty plate work or fast, accurate shearing of thin sheet. At the Alameda Naval Air Station, the 3/8" Pacific Shear (photo above) is quickly set to .001" knife clearance for .005" sheet and is reset rapidly and easily for cutting plate up to 3/8" thick. In any plant, large or small, a single Pacific Hydraulic will shear a complete range of metal thicknesses at a substantial savings in capital investment and operating costs.

PACIFIC PRESSES AND SHEARS

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Now **you can get USS "T-1" Steel from Steel Service Centers coast to coast.**

"T-1" Steel throat swallows 150,000 tons of coal a year

This mining machine in action looks like a greedy dragon at the mine face, stuffing its mouth with coal at the rate of about 150,000 tons a year.

The material selected for the conveyor "throat" was USS "T-1" Steel. The designers and builders, Lee-Norse Company, wanted a steel that would stand up under the grinding action of the coal for at least 200,000 tons. So far, USS "T-1" Steel has more than met their expectations . . . not only in the conveyor deck plates but also in the crawler wear plates.

Recently, one of these machines was rebuilt, yet it will continue to use its *original* "T-1" Steel conveyor deck plates. These plates handled about 260,000 tons of coal on the first time around and there's a possibility they might be able to handle another 250,000 tons before replacement is needed.

The reasons for the long life of USS "T-1" Steel are its high resistance to impact abrasion, plus great strength and toughness. In other applications, such as shovel teeth and lips, chutes and vibrating screens, USS "T-1" Steel has outlasted other metals up to five times! This means substantial reductions in maintenance costs and the big machines stay on the job longer.

USS "T-1" Steel and the new, lower-priced "T-1" type A Steel can be furnished to a minimum yield strength of 100,000 psi, or a minimum hardness of 321 Brinell, depending on application. USS "T-1" Steel can also be furnished to 360 Brinell. All of these tough, weldable steels can reduce weight and increase the strength and life of your equipment. Call your local Steel Service Center for more information. Or, for the name of the distributor of USS "T-1" Steels nearest you, write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. USS and "T-1" are registered trademarks.

United States Steel Corporation • Columbia-Geneva Steel Division • National Tube Division • Tennessee Coal and Iron Division • United States Steel Export Company

United States Steel

STEEL Goes Abroad

The editors will enlarge this publication's world - wide coverage. George Howick has been appointed international editor to spearhead the move. He is increasing STEEL's network of overseas correspondents who will report on foreign economic, technological, and political happenings and trends of significance to U. S. metalworking managers. We will also expand our coverage of topics relating to export strategy and tactics and to foreign private investment. And in January, we will begin to add the top overseas metalworking plants to our circulation list.

It's easy to see the need for such international reporting and overseas circulation when you consider facts like these: Europe's imports more than doubled between 1950 and 1960. So did Japan's. And the nations of Latin America, Asia, and Africa are developing their economies so rapidly that they are lucrative potential markets. World imports soared from $75.9 billion in 1953 to $118.2 billion last year, and they're running even higher this year.

Incidental Intelligence

Geraldine, our cleaning woman and night editor, picks up these gleanings from the editors' wastebaskets:

Item: In one European country, contractors building an oil pipeline were unable to move laborers away from their "home" district. All unskilled labor had to be discharged and new men hired about every 6 miles.

Item: At least one geneticist wants to establish a sperm bank to insure survival.

New Stethoscope

We particularly like this item from *Punch*, the English humor magazine. It appeared in its Aug. 30 Science Survey column:

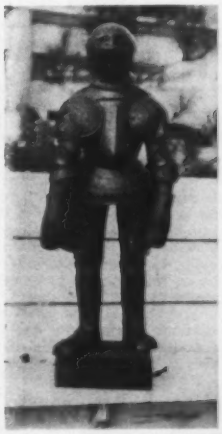
"The Splodd-Hopper Instrument Co. have developed a stethoscope for use on patients who refuse to disrobe. It pierces the clothing whatever its thickness and has an auxiliary rotary action that will drill through metal. It comes in pastel shades. Splodd-Hopper are noted for their personnel amenity programme. Sir Ephra Hopper personally conducts the choral society and Councillor Splodd runs the Works Marriage Guidance Council."

Rerun

A while ago, Editor Walt Campbell, Associate Managing Editor John Morgan, and International Editor George Howick appeared on Open Forum, a program originating at radio station WGAR in Cleveland. Their subject was automation, and their job was to answer questions telephoned in by listeners. Moderator Sidney Andorn picked them for the program because of STEEL's impact issue on "Automation and Jobs," Sept. 4.

For 45 minutes, the editors coped with all types of queries. Around 70 remained unanswered as time ran out. Consequently, the triumvirate will make its second appearance on the program at 8:15 p. m. (EST), Dec. 1.

Christmas Gift



Detroit Editor Don Postma's wife dragged him to an antique shop last weekend where he encountered the metalworking art pictured here.

In days of old when knights were bold, they needed handmade protective armor. All of us have seen it in museums. But how many of you have seen small, scale models like this?

It was the custom for master armorers to show models to clients so they could make a selection. The practice may be one of the earliest examples of display advertising.

The model here (it's 2 ft high) was made in France during the 16th Century. An apprentice was usually responsible for the production of the model. It gave him experience.

Relatively few models have survived the ages, says antique dealer Austin Grant, Farmington, Mich. He's offering this one for $200. We put it on our list of Christmas gift ideas for the metalworking executive who has everything.

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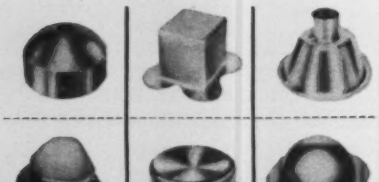
KAUPP
PRECISION-FORMED
METAL COMPONENTS

Hydroforming, Deep Drawing and Spinning

You can depend on KAUPP for complete service from design to delivery on precision-made metal parts and sub-assemblies. Ultra modern metal working facilities, plus wide experience on military and commercial requirements are available to solve your problems. Send drawings for quotations or phone for new illustrated bulletins!



Closest tolerances adhered to in all metals, including MU METAL, BRASS, INCONEL, ALUMINUM, COPPER, CARBON STEEL, STAINLESS STEEL, NICKEL, MAGNESIUM, TITANIUM, SILVER, SPECIAL ALLOYS, HAYNES STELLITE.

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METAL CRAFTSMEN SINCE 1924

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TIPS FROM A ROLL MAKER'S NOTEBOOK

MACKINTOSH-HEMPHILL DIVISION, E. W. BLISS COMPANY, Pittsburgh 3, Pennsylvania

Cast mill rolls • Cinder pots • rotary tube straighteners • end-thrust bearings • heavy-duty lathes • steel and special alloy castings

Plain body rolls are a good buy for merchant mills

Ordering your roughing and intermediate stand rolls with plain bodies can save you money two ways – initially in the price of the roll, as a result of lower turning and molding charges and secondly, by reducing your roll inventory. When you cut your own passes, you have complete latitude in your use of the rolls, since you can "tailor" the rolls for your specific demands.

HARDNESS PENETRATION THE SECRET

Naturally, buying plain merchant mill rolls involves some care in choosing a suitable analysis: the rolls you order must have sufficient hardness penetration to provide for any of the pass depths you will need.

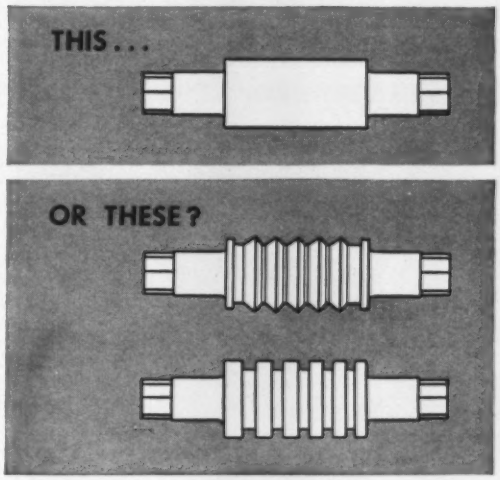
This is not as much a problem as it once was. Recent developments in roll metallurgy and heat treatment have made it possible to produce constant hardness from the surface to the center of the alloy steel rolls that we normally recommend for merchant mill service.

Thus, the only considerations are the severity of the service, and the hardness level that will provide the wear resistance the rolls need to serve any given campaign without requiring redressing.

The Mack-Hemp rolls that have proved themselves time and again in merchant mills are –

Technikrome—Formerly adamite, this is one of the most popular of all trade-named alloy steel rolls on the market. It is available in a wide range of carbon contents and heat treatments, with hardness from 36 to 52 Shore (C Scale).

Supermetal – Higher in alloy content, this roll possesses qualities common to cast steel in its strength and to cast iron in its wear resistance. Its fine, homogeneous structure makes it suitable for finishing rolls as well as roughing and intermediate stands. Available in hardnesses up to 55 Shore.



Stironite – An alloy steel in which the graphite occurs in unusually small particles, distributed uniformly throughout, thus possessing the finishing qualities of cast iron. These rolls are especially well suited for finishing. Available in hardnesses from 42 to 55.

All these roll analyses are stronger than the latest types of alloy cast iron, and, in the case of Supermetal and Stironite, as pointed out above, have many of cast iron's advantages as a material for mill rolls.

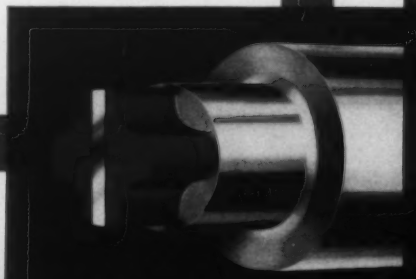
Whatever the type of mill you operate, you'll find that our trained roll engineers, backed by Mack-Hemp's 138 years of experience with mill rolls, can give you helpful advice on any rolling problem that's bothering you. Their assistance is yours for the asking. Simply write or telephone us at HEmlock 1-3000.

MACKINTOSH-HEMPHILL

You get more tonnage from "the rolls with the Striped Red Wabblers"

Division of E. W. BLISS COMPANY

Presses, Rolling Mills, Special Machinery



ROBOTROL

"PUNCH CARD" SYSTEM WORKS LIKE THIS

With this system a standard punch card is the job ticket. The metallurgical department punches it to set up treatment factors for desired result. When the work arrives at the furnace the operator merely puts the card in the Robotrol panel. He can't treat the work without putting the card in. He can't put it in wrong. He doesn't have to read or set instruments, adjust dew points, time carburizing and diffusing periods, decide on type and timing of quench. The punch card controls these automatically. It can provide for a variety of operations and required cautionary procedures. As the work moves on and is completed the punch card provides a permanent record of the exact treatment given it.

CONCEPT IN HEAT TREATING TECHNIQUE.

'PUNCH CARD' QUALITY CONTROL SYSTEM NOW PERFECTED.

For the first time automatic quality control in heat treating

System completely eliminates factor of furnace operator error

Provides exact record of metallurgical treatment on every job

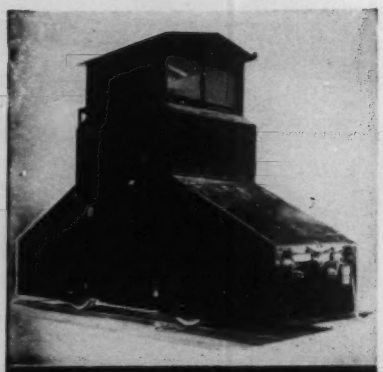
LINDBERG ROBOTROL

Guarantees you precise uniformity and quality in heat treating

Introduced at the recent ASM Show at Detroit, this new Lindberg Robotrol automatic quality control system has been in development for more than five years. With this punch card system pyrometers, timers, atmosphere control instruments and all the factors on which metallurgical results are dependent are set up and automatically controlled. It is practically impossible for the furnace operator to treat the work improperly.

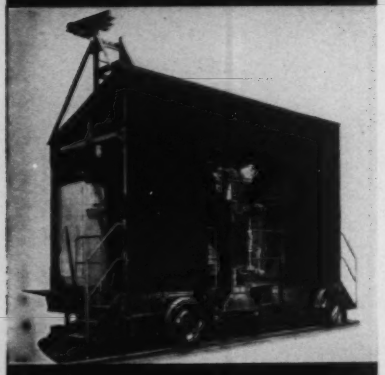
The punch card also provides an exact record of the treatment given each job. You know exactly what happened.

The Robotrol system is extremely flexible and can be adapted to any kind of heat treating cycle. For full information consult your local Lindberg Field Representative (see classified phone book) or write us direct.



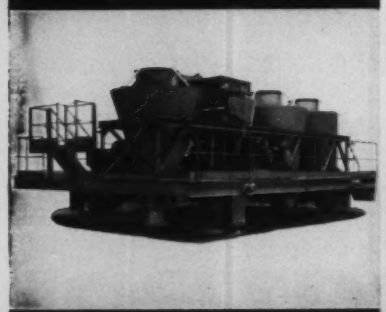
QUENCHER LOCOMOTIVE

COKE ON THE MOVE



DOOR MACHINE

Operating economy and long life, again, are major advantages of Atlas equipment for highly specialized coke-producing service. Specially designed and ruggedly built to your exacting requirements.



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COKE QUENCHING CAR

Since 1896, Engineers-Builders of Ore Transfers... Scale Cars ... Coke Quenchers ... Coal Larries ... Door Machines ... Safety-Type Transfers ... Storage Battery Locomotives

ATLAS CAR & MFG. COMPANY

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CALENDAR OF MEETINGS

Nov. 21, Manufacturing Chemists' Association Inc.: Semiannual meeting and conference, Commodore Hotel, New York. Association's address: 1825 Connecticut Ave. N. W., Washington 9, D. C. Executive secretary: Maurice Crass Jr.

Nov. 25-29, Industrial and Government Surplus Trade Exposition: At Veterans' Memorial Auditorium, Columbus, Ohio. Contact: Horst H. Backer, executive director, National Surplus Dealers Association, Suite 610, 79 W. Monroe, Chicago 3, Ill.

Nov. 26-Dec. 1, American Society of Mechanical Engineers: Winter annual meeting, Statler Hilton Hotel, New York. Society's address: 345 E. 47th St., New York, N. Y. Secretary: O. B. Schier.

Nov. 27-29, Plumbing Brass Institute: Annual meeting, Savoy-Hilton Hotel, New York. Institute's address: 1 Gateway Center, Pittsburgh 22, Pa. Executive secretary: T. H. Nichols.

Nov. 27-30, American Institute of Steel Construction Inc.: Annual meeting, Boca Raton Hotel and Club, Boca Raton, Fla. Institute's address: 101 Park Ave., New York 17, N. Y. Executive vice president: L. Abbett Post.

Nov. 28-30, Electronic Industries Association: Section meetings, Statler Hilton Hotel, Los Angeles. Association's address: 1721 DeSales St. N. W., Washington 6, D. C. Secretary: James D. Secrest.

Dec. 1, Malleable Founders Society: Semiannual meeting, Sheraton-Cleveland Hotel, Cleveland. Society's address: 781 Union Commerce Bldg., Cleveland 14, Ohio. Executive vice president: Lowell D. Ryan.

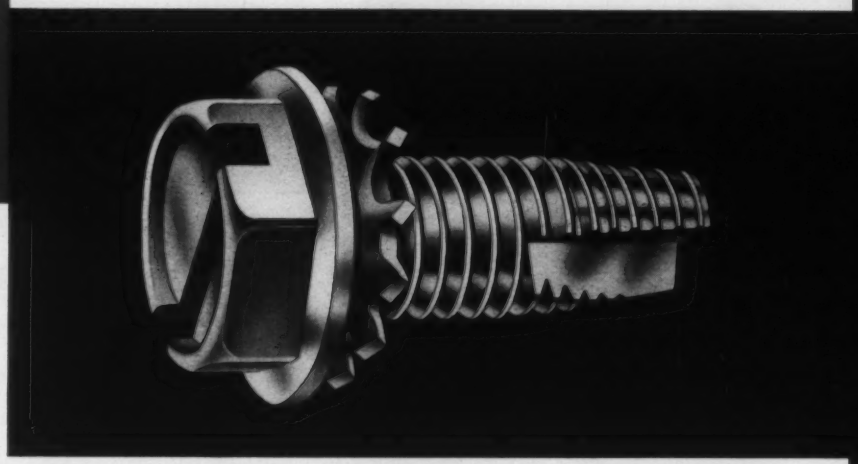
Dec. 1-3, National Federation of Independent Scrap Yard Dealers Inc.: Annual convention, Barbizon-Plaza Hotel, New York. Federation's address: Suite 1607, 29 Broadway, New York 6, N. Y. Administrative secretary: Lucille Schneider.

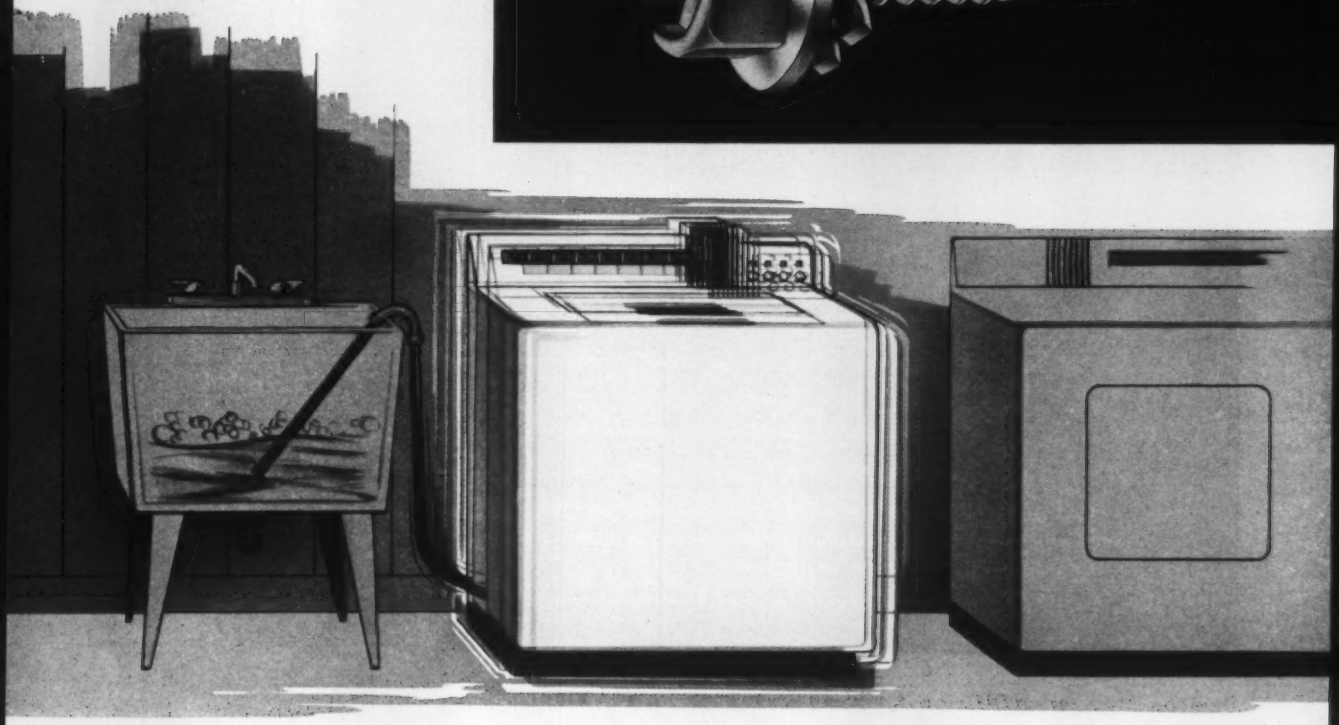
Dec. 5, Electric Overhead Crane Institute Inc.: Annual meeting, Carlton House, Pittsburgh. Institute's address: 1 Thomas Circle, Washington 5, D. C. Executive secretary: Joe H. Peritz.

Dec. 6-8, Metallurgical Society of AIME: Annual electric furnace conference, Iron & Steel Division, Penn-Sheraton Hotel, Pittsburgh. Society's address: 345 E. 47th St., New York, N. Y. Secretary: R. W. Shearman.

Dec. 7-8, Society of the Plastics Industry Inc.: Plastic film, sheeting, and coated fabrics conference, Pierre Hotel, New York. Society's address: 250 Park Ave., New York 17, N. Y. Executive vice president: William T. Cruse.

approved
by the
appliance
INDUSTRY





locked in for savings

Today, even our most modern products are subjected to violent rock, rattle and roll motions each time they are put in use. Severe vibration in product operation demands a vibration free fastener that will grab and hold . . . and hold . . . and hold. The sems thread cutting fastener with the multi tooth lock washer is but one of the many standard GLS locking fasteners that do this job with assurance. It cuts its own way by removing metal to form mating threads thus creating a vibration free bond. When held tight by the lock washer it cannot even back out. No need to order complicated specials when you can get the very best for pennies per installation. Great Lakes Screw Corporation is currently supplying vibration free fasteners for hundreds of different product applications—all are . . . *locked in for savings.*

GSL

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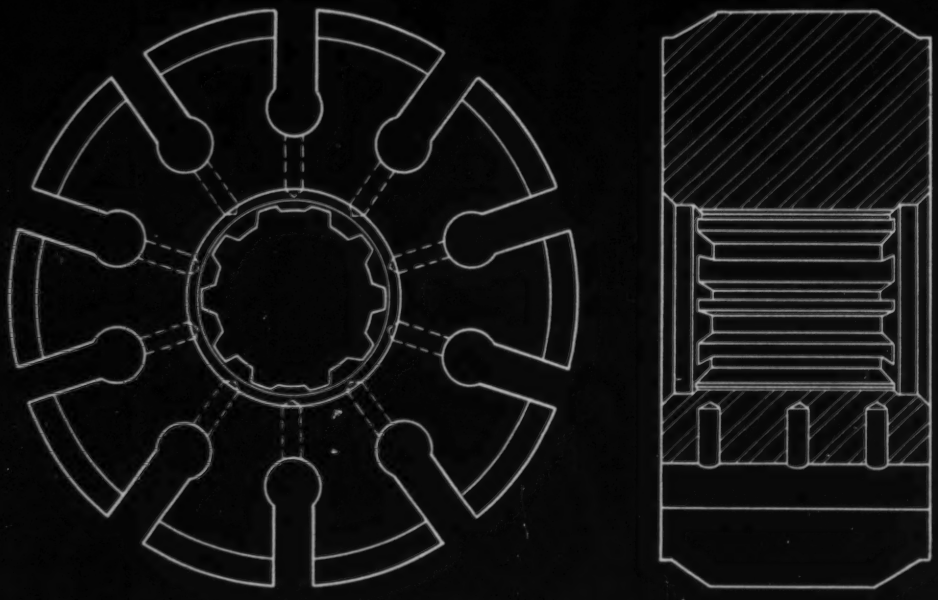
At Denison — $30,343.50

This is the part:



VANE TYPE HYDRAULIC PUMP ROTOR machined from a 4150 steel forging. Operation: Broaching splines and vane slots. Tolerances: .001" before grinding.

Denison Engineering Division, American Brake Shoe Company, makes a broad line of precision hydraulic presses, pumps and controls. Cost of tool change down time on three vertical broaches was high. Denison turned to Mobil for help.

Mobil recommended use of its new Mobilmet 27 cutting oil. Down time was reduced over 30% . . . 44.5% fewer tool grinds were needed . . . with five-figure savings any plant would welcome.

Mobilmet 27 is a unique cutting oil. Its pressure-temperature-selective additive composition was developed and patented by Mobil. We know that even in a single cutting operation, pressures, temperatures and other conditions can vary widely. Mobilmet oils have an inbuilt ability to adapt to these variables. They have given a new and really broad meaning to the words multi-range, multi-metal, etc.

Mobilmet 27 keeps tools sharp far longer, with substantial savings. Hard, brittle and draggy metals of many kinds are machined to close tolerances, often with no subsequent finishing operation. Speeds and feeds can often be increased with fewer tool grinds. Staining problems are minimized.

Vernon Smith, Assistant Plant Engineer (at right), and Mobil Representative H. M. Lamb inspect vane pump rotor at Denison's Delaware, Ohio plant.

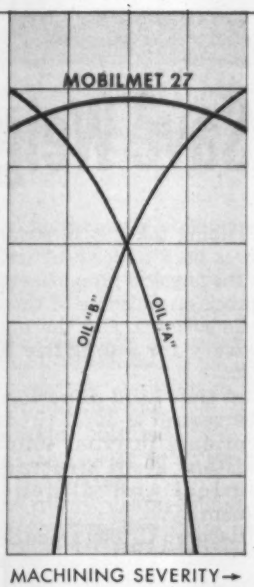
Look into these remarkable Mobilmet oils. You can get details quickly from your Mobil Representative or by writing to: Mobil Oil Company, 150 East 42nd Street, New York 17, New York.

saved with Mobil® help

$24,606 saved in production time. Yearly tool change down time on Denison's three broaches was 1,333.2 hrs., valued at $40 an hour—$53,328 yearly. Using Mobilmet 27 this cost was cut to $36,924, saving $16,404 annually—$24,606 for the 18-month period of use.

$5,737.50 saved in tool grinding. Broach strings formerly required 165 tool grinds yearly for the three machines. With Mobilmet 27, only 114 tool grinds were needed yearly. Thus, Denison saves 51 tool grinds yearly at $75 each—$3,825 a year, $5,737.50 for 18 months.

When the right cutting oil can save $30,343.50, finding that oil is mighty important. Denison found this oil in Mobilmet 27 for broaching slots to .001" tolerances in vane pump rotors that deliver up to 2,000 psi.



MOBILMET 27 with pressure-temperature-selective additive action guards tools . . . speeds work . . . improves finishes.

Mobilmet 27 has a unique ability to handle many metals—many machining conditions, as symbolized here. Red line indicates how Mobilmet 27's tool and finish protective action bridges *both* the conditions met by single-purpose, low-activity oil (A), single-purpose, high-activity oil (B), *and all conditions between.*

The reason: a revolutionary patented additive composition that is pressure-temperature-selective in its action. On tough, draggy steels, Mobilmet 27 has high additive activity, *controlling* built-up edge . . . permits high cutting speeds, assures superior finish and minimum tool wear. And on hard but clean-cutting metals, Mobilmet 27 has low additive activity, *permitting* formation of a proper protective built-up edge . . . allows high cutting speeds, minimizes wear on lip and cutting edge of tool.

One oil replaces many . . . tools stay sharp . . . tool grinds are fewer . . . output is increased . . . tolerances and finishes are improved . . . unit costs are reduced.

Mobil

MOBIL OIL COMPANY
150 East 42nd Street
New York 17, N.Y.

Standard Forge & Axle Co. forges 5-inch by ½-inch Pittsburgh Seamless Mechanical Tube ends down to 2⅝" solid steel wheel spindle ends (cross section above). The Montgomery, Ala., plant then machines and grinds bearing surfaces to .0005-inch tolerance to produce single-piece, 20,000 pound capacity trailer axles. Trailer operators benefit from higher payloads because . . .

They Throw Away The Holes—And Save Weight

The trick in making a seamless steel tube is piercing a hole in a round of solid steel.

But Pittsburgh Steel Company's Seamless Steel Mechanical Tubing makes the full circle in production of trailer axles at Standard Forge & Axle Co., Montgomery, Ala.

Standard, in effect, throws away the holes by forging the tube ends down to solid steel again, leaving only a hollow steel center and spindle section.

The result: a lightweight, one-piece trailer axle made entirely from a single length of seamless tube—including load bearing wheel spindles, precision ground for bearing and seal seats.

The advantage: assured strength and safety of seamless steel, plus, for example, reduced axle weight for trailer operators in a 20,000 pound capacity axle.

Starting with a seamless steel tube 5" x ½" x 87⅞" for this particular axle, Standard upsets both ends, then swages them down to the shape of a spindle with a 2⅝" solid end.

That's deformation of the roughest kind.

But Pittsburgh Seamless Mechanical Tubing takes it in stride, then bounces back under heat treatment with the physical properties required for precision finishing of the critical spindle surfaces, and the toughness necessary for a long life in hard service.

And that kind of performance takes seamless steel tubes with exceptional internal soundness, consistent grain structure, and chemical and dimensional uniformity.

Pittsburgh C-1040 grade Seamless Mechanical Tubing supplies these properties consistently—for this type

After upset, Pittsburgh Seamless Mechanical Tubes, with 5-inch OD and ½-inch wall, are swaged to solid steel spindle shape on drop forge, at right. Standard's heat treating process refines grain, restores toughness of steel.

Standard also produces high-strength inserted spindle trailer axle by inserting forged alloy steel spindle with 4.065-inch OD into 4.040-inch burnished ID of 5-inch seamless steel tube under 50,000-pounds pressure.

Standard Forge & Axle Sales Manager James A. Rumbley says Pittsburgh Steel Company, as longtime major supplier of seamless mechanical tubes, "leaves nothing to be desired in product or service."

axle and for Standard's high-strength inserted spindle type.

James A. Rumbley, Standard's sales manager, says:

"Trailer axles are high-weight carrying members subject to tremendous load shocks. So we use the finest materials available to assure our customers trouble-free service. Seamless steel mechanical tubes help us to do that, with complete safety and at less weight.

"For many years, Pittsburgh Steel Company has been one of our major tubing suppliers. It has left nothing to be desired either in product or service."

That's standard practice with Pittsburgh Steel—whether supplying seamless mechanical tubing to Standard's specific requirements, or to yours. Be certain with Pittsburgh Seamless. Contact one of the district offices listed below.

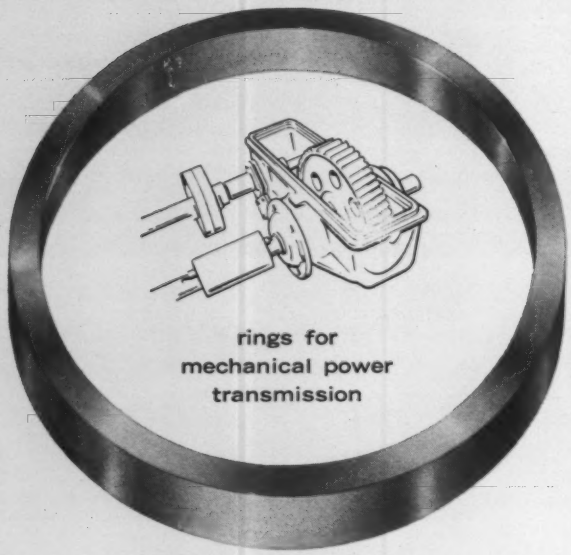
Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES

Atlanta	Cleveland	Dayton	Los Angeles	Pittsburgh
Chicago	Dallas	Detroit	New York	Tulsa
		Houston	Philadelphia	Warren, Ohio

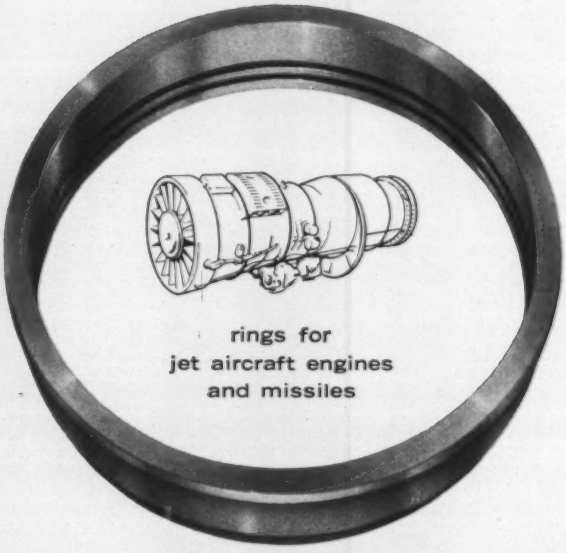
Steel



rings for
mechanical power
transmission

rings for
construction equipment
and machinery

rings for
fabricated metal
plate work



rings for
jet aircraft engines
and missiles

we make rings-you save money

Amweld flash butt-welded rings provide a welcome cost reduction opportunity for almost any manufacturer using rings of between four inches and eight feet in diameter from most of the common and exotic alloy metals. Amweld rings save on material because rings are formed closer to finished dimensions. Amweld rings save on machining, because the metal is left out—not hogged out.

Amweld customers saved over one million dollars last year. By close cost evaluation of circular components and assemblies, flash welded rings were introduced enabling substantial savings. It doesn't cost you to think on paper with Amweld. Let us quote you for your cost comparison. Write today: The American Welding & Manufacturing Company, 800 Dietz Road, Warren, Ohio.

AMWELD®
INDUSTRIAL PRODUCTS

THE AMERICAN WELDING & MANUFACTURING CO., WARREN, OHIO

How Manufacturers' Earnings Stack Up

A check of earning reports of 597 manufacturing firms by the First National City Bank of New York shows that net profits in the third quarter topped the year ago pace by 7 per cent, but they were 5 per cent under the second quarter's. And earnings over the first nine months shrank 6 per cent below those of the comparable 1960 period. Here's how nine month earnings compared with last year's:

All Manufacturing	−6%	Nonferrous Metals	−6%
Iron & Steel	−32	Autos & Parts	−31
Electrical Equipment	−23	Other Transportation Equipment	+*
Machinery	+16	Other Metal Products	−1

*Increase of less than 0.5 per cent.

'Some Price Relief Needed,' Says Steel Executive

A steel price hike in the near future is a "matter of pure conjecture," says Derrick Brewster, general sales manager, Inland Steel Co. But, he notes, "it seems clear to everyone that to improve our profits picture, we are going to need at some time in the not too distant future an increase in prices." Despite cost-cutting programs and efforts to enlarge steel markets, profits continue to decline. "We feel that to earn a reasonable profit, we need some price relief."

Retail Sales Spurt Upward

Retail sales in October jumped 2 per cent to $18.588 billion from the previous month—the highest since April, 1960. The surge is attributed mainly to improved marketing of new cars although sales of clothing and general merchandise rose appreciably.

Shipments of Electrical Measuring Instruments Climb

Manufacturers' shipments of electrical measuring instruments in the second quarter were valued at $39.1 million compared with $32.5 million for the first quarter, says the Commerce Department. The gain was registered despite a drop in the number of units shipped. The value of second quarter shipments was about 25 per cent higher than that in the corresponding 1960 period. Military shipments accounted for $15.2 million of the total.

New Study Indicates Steel Imports Are Here to Stay

The steel import problem for the domestic producer will get more, not less, intense, warns a new study by Fordham University's Industrial Economics Program entitled *The Steel Import Problem*. Summarizes the 111-page study: "Imports have as their base something more substantial than a strike inducement; there are too many elements of permanence to dismiss them as a tem-

porary phenomenon." The study also points out the need for depreciation reform in the U. S. It says, "Our ability to compete successfully and to provide new jobs will depend, in part, upon the installation of new and up to date facilities. A larger source of internal funds is one of the answers to this need."

Making Foreign Aid Effective

"An underdeveloped country is no place for underdeveloped experts," says Richard N. Benjamin, president, Stone & Webster Inc., New York. Needed: Technical aid, skilled manpower, and increased capital investments in emergent economies. He warns: Poor countries will not wait for progress and "a similar urgency must inspire the West's programs to win new friends for private enterprise." Mr. Benjamin looks for integrated foreign aid programs, merging government and private strengths.

Multimillion Dollar Market for Earth Moving Equipment

Africa's underdeveloped countries offer a big opportunity for U. S. makers of earth moving machinery, says Hugh H. McGregor, director, Production-Engineering Ltd., London, England, international management consultant. The fast expanding, multimillion dollar market could be substantially increased, he believes, if U. S. firms would provide more assistance on the proper utilization of equipment. In Africa, earth moving equipment is frequently out of operation due to poor planning, bad maintenance, and lack of spare parts. The equipment often isn't used effectively when it is in working order.

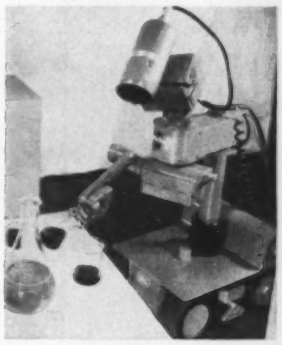
Japan to Import 48 Million Tons of Iron Ore in '70

Look for Japan to import 48 million tons of iron ore annually by 1970—the year in which the nation's crude steel capacity is expected to reach 48 million tons (vs. about 29 million in fiscal 1960). By 1970, Japan expects to be importing 18 million tons of iron ore annually from Malaya and Goa and 10 million tons (each) from India, Africa, and South America. At least 60 per cent of the ore may be hauled by Japan's carriers.

Ford, GM Vie for Australian Market

Leadership of General Motors' Holden is being challenged in the Australian car market. Ford's Falcon has badly dented Holden sales by extending its warranty to 12,000 miles or 12 months and introducing the automatic transmission. Holden now offers a similar warranty and an automatic model. Ford's share of the market has risen to about 23 per cent while Holden's has dropped to 42 per cent from a peak of about 50 per cent.

'Little Ranger' Is New Mechanical Man



Demonstrating its dexterity and delicate touch, the "Little Ranger" pours liquid from a beaker as its TV eye "watches." The remotely controlled, vehicular manipulator is being marketed by General Mills Inc.'s Automatic Handling Equipment Dept. for use in and around radioactive and other dangerous areas. It was demonstrated at the Atomic Industrial Forum's Atomfair in Chicago. The mechanical slave has its own voice (an intercom system). A hoist can also be attached and remotely controlled.

Outlook for College Graduates: More Jobs, Higher Pay

More job opportunities, fewer available students, and a bright future—that's the situation awaiting midterm graduates, says J. Douglas Snider, business placement officer, Indiana University. He says, "Expenditures resulting from the Berlin crisis, coupled with expanding business facilities, have provided a record number of employment opportunities." Graduates will command the highest starting salaries to date, he believes—3 to 5 per cent higher than last year's.

Iron and Steel Employment Rising

Employment in the iron and steel industry increased to 550,524 in September—up 5231 from August, says the American Iron & Steel Institute. Due to shorter workweeks (37.3 hours vs. 37.8 in August), however, the aggregate payroll for hourly and salaried workers dropped from $336.8 million to $332.6 million. Hourly employee payroll costs rose 3.9 cents an hour in September.

Jobs Growing Fastest in Low Pay Trades

Relatively low wages in the fast growing service industries tend to "brake overall consumer buying power," says Prentice-Hall Inc. Average weekly gross wages in manufacturing were $91 last year, up 53 per cent from 1950's. Construction wages rose 63 per cent to a $120 average. In retailing, where jobs are growing faster, wages rose only 43 per cent to $68, and in service jobs, wages increased 36 per cent to $50.

Progress in Casting Demonstrated

Winners of the $10,000 contest sponsored by the Steel Founders of America Inc. have been announced. Prizes were awarded in these categories: Reduction of end cost, mechanical design, metallurgical design, redesign or conversion, and unusual or unique design. For a look at the five top winners, see Pages 90-92.

Liberal Depreciation: A Must for Railroads, Says Renz

Walter A. Renz, executive vice president, American Railway Car Institute, has told the Administration that railroads and shippers who own rolling

STEEL
The Metalworking Weekly

November 20, 1961 Vol. 149 No. 21

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stock "have reached what we consider to be the major impasse in their economic development." Noting that the average age of a freight car on American railroads is nearly 19 years and the passenger car fleet averages nearly 30 years, he says, "A depreciation rate with a maximum of a 15-year life for rail equipment is an economic must for the survival of our common carriers and private owners."

New Areas for Cutting Costs

Donald MacGregor, vice president-production, Zenith Radio Corp., states: Overhead costs "have been growing alarmingly and it is here that we have one of several means of meeting foreign competition. Manufacturing overheads have been given a lot of attention, but this is not always true of some selling, administrative, and engineering overheads. These three have been drawing . . . much less surveillance by top management. Unquestionably these costs have gotten out of hand."

Straws in the Wind

Spendable earnings and the buying power of factory workers declined in September, says the Commerce Department. Weekly earnings dropped about $1, and the cost of living rose 0.2 per cent . . . American Trucking Associations Inc. reports that intercity tonnage in the week ended Nov. 4 was 8.7 per cent ahead of that of the corresponding week of 1960 and 2.3 per cent above that of the previous week . . . The UAW and Allis-Chalmers Mfg. Co. have agreed to an indefinite extension of present labor agreements, subject to seven day cancellation upon written notice by either party . . . Judson S. Sayre, chairman, Norge Div., Borg-Warner Corp., says factory sales of Norge appliances this year are expected to be second only to 1955's (they'll be within 5 per cent of the record) . . . The Netherlands would like to build a steel mill near Amsterdam. The integrated facility, which is at the talking stage, could be operating in five years . . . The International Bank for Reconstruction & Development has loaned Peru $10 million to import equipment and materials for highway maintenance and improvement.

Metalworking Pulse

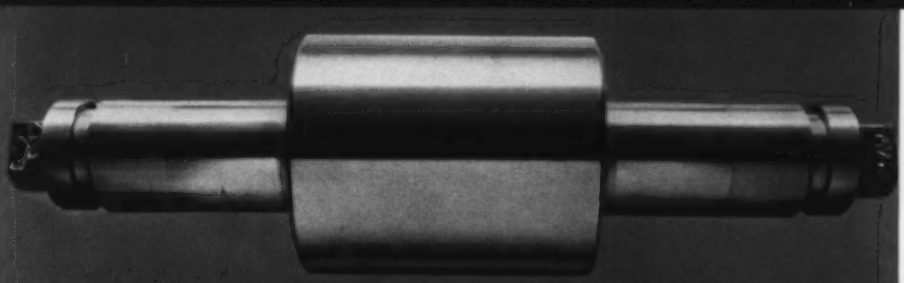
The Business Trend: A small dip in auto output and a major, seasonal decline in freight carloadings pulled STEEL's industrial production index down 1 point to a preliminary 173. **Autos:** Minor week to week fluctuations will occur as the auto industry juggles its workweek, but production schedules should remain near the 600,000 a month clip for some time. **Steel:** Ingot production continued to be restrained as a result of faltering demand.

- **INDUSTRIAL PRODUCTION INDEX**
  (1947-49 = 100)
  Week ended Nov. 11 . . . 173†
  Year ago 150
  Details on Page 79
- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended Nov. 18 . 152,000*
  Year ago 149,753
  Details on Page 76
- **STEEL INGOT OUTPUT (TONS)**
  Week ended Nov. 18 2,044,000*
  Week ago 2,046,000
  Details on Page 132

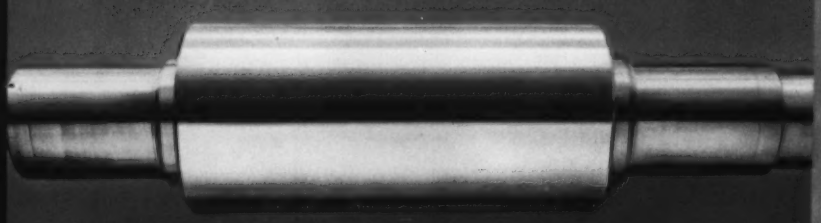
†Preliminary. *Estimated.

Steel

for Strength
. . . Economy
. . . Versatility



Vacuum-degassed forged steel back-up roll



Vacuum-degassed hardened steel work roll

Forged steel back-up roll sleeve

Cast iron back-up roll sleeve

NEW!

Bethlehem iron sleeves for temper mills

Bethlehem cast iron back-up roll sleeves have proved themselves for over six years in Bethlehem's own temper mills. Now we're making them available to everybody. They're an important addition to our line of top-quality rolls and sleeves for temper and cold-reduction mills.

BETHLEHEM STEEL

BETHLEHEM STEEL

Pouring iron for sleeve into chill mold.

GET MORE TONNAGE FROM TEMPER MILLS

with Bethlehem cast iron back-up roll sleeves

Over the past six years, we've produced many of these iron sleeves for our own temper mills. They've averaged 340 per cent more tons production on sheet temper mills than previous sleeves . . . 300 per cent more tons production on tin temper mills. Not one has split. Not one has slipped.

Grinding bore of cast iron sleeve.

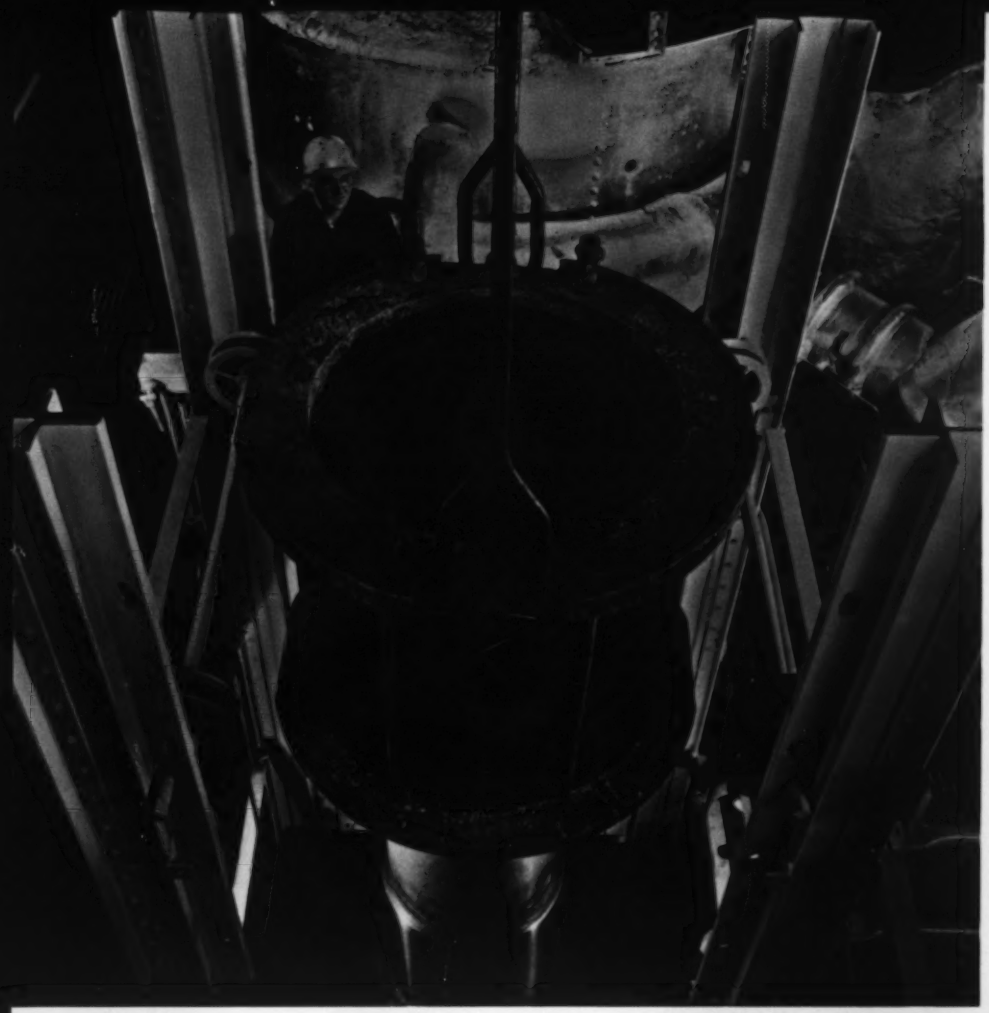
Most rolling mill people agree that *iron* back-up rolls on temper mills produce more tonnage than any other kind of rolls. Practically all blackplate, and tinplate mills use them; so do many sheet mills. Since there's less "build-up" on iron rolls, you don't have to grind as often (which cuts downtime) . . . or remove as much per grind (which lengthens service life).

But not everyone agrees on which kind of iron back-up roll to use. The *one-piece* cast iron back-up roll? Or the cast iron back-up roll *sleeve*?

The iron sleeve gets our vote

Back in 1955, Bethlehem pioneered the development of a cast *iron* sleeve mounted on a *steel* arbor. This combines the best of both—the best possible working surface with the best possible

Grinding steel arbor with shrink allowance.



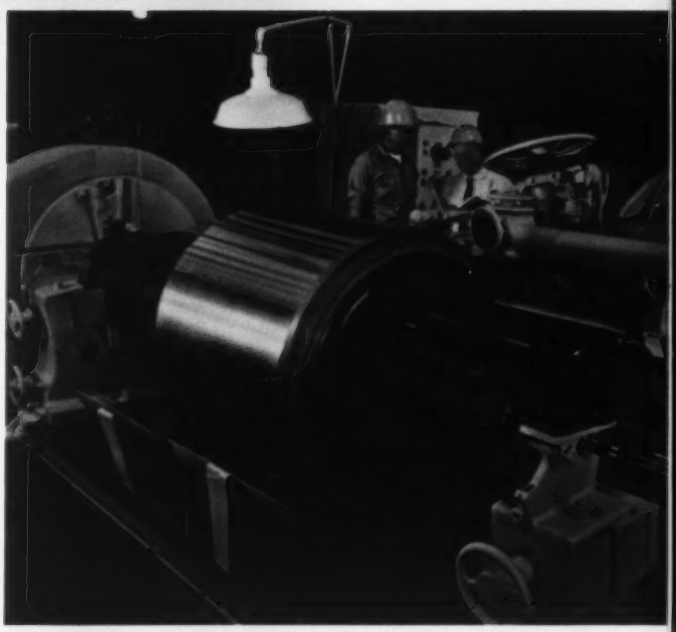
Here the holding device with cast iron sleeve is being lowered onto steel arbor. Sleeve is first heated to about 500 deg in order to expand bore. Then it is lowered, as shown. When the sleeve cools and contracts, it forms a tight "shrink fit."

neck strength. It's also a lot less expensive to mount a cast iron sleeve on an existing steel arbor than it is to buy a new one-piece cast iron back-up roll.

But let us hasten to add that if you now use one-piece cast iron back-up rolls, *and have found the neck strength adequate*, you've also got a fine opportunity to re-sleeve with a Bethlehem iron sleeve. And at a nice savings, too.

Fast delivery . . . attractive prices

You can count on good delivery of Bethlehem iron sleeves. And the price is right. For more information about Bethlehem cast iron back-up roll sleeves—and how they increased production on our own temper mills by 300 per cent and more—call or write the Bethlehem sales office nearest you. Or write to us at Bethlehem, Pa.

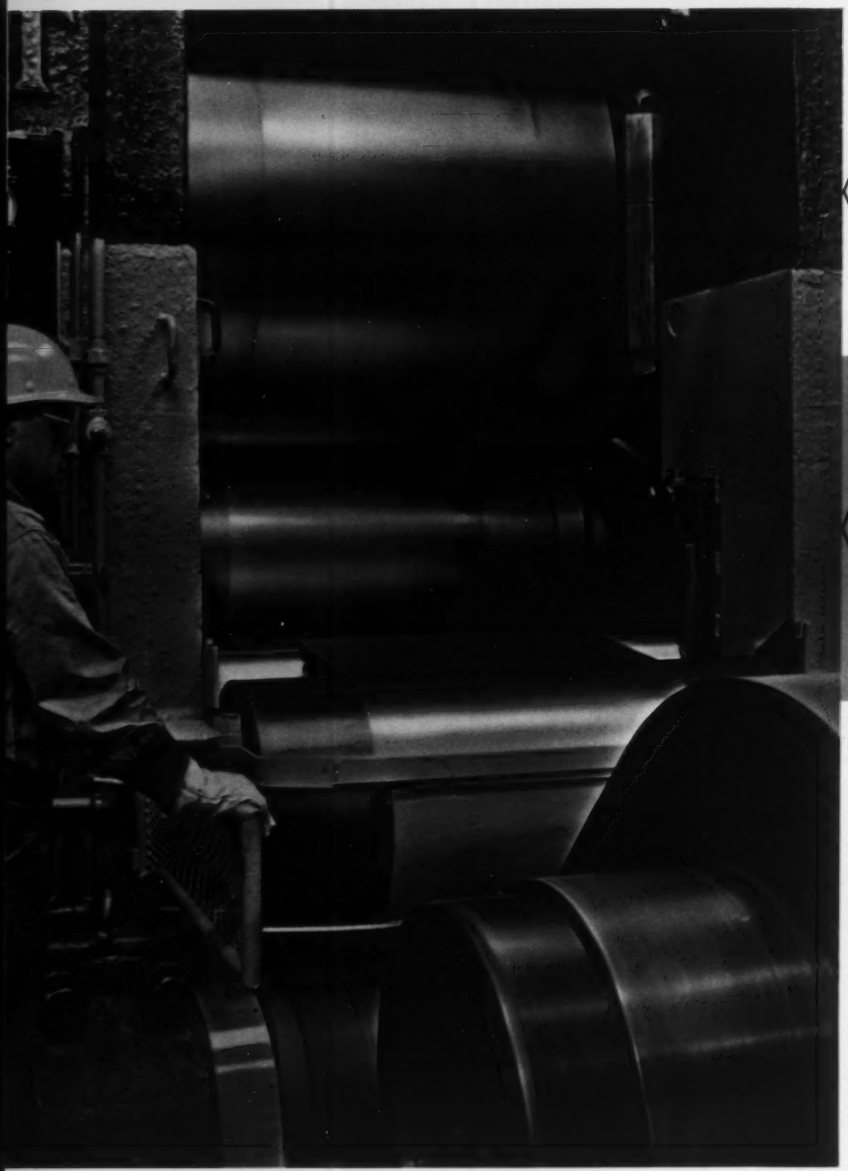


Finish grinding of the cast iron roll sleeve-and-arbor assembly.

BETHLEHEM STEEL

BETHLEHEM STEEL

TOP-TONNAGE TEAM FOR TEMPER MILLS



Bethlehem cast iron back-up roll sleeve

In our own mills, they've averaged 340 per cent more tons on sheet temper mills than previous sleeves . . . 300 per cent more tons on tin temper mills.

BETHLEHEM VACUUM-DEGASSED HARDENED STEEL ROLL

Bethlehem vacuum-degassed hardened steel work roll

These hardened-and-ground forged steel rolls minimize the hazard of roll breakage, increase production. Forged from vacuum-degassed steel . . . from steel that is sounder, tougher, and cleaner than air-cast steel. Deliveries are excellent. And there's no price extra!

BETHLEHEM STEEL COMPANY,
BETHLEHEM, PA.

Export Sales:
Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

SODA ASH

from Wyoming... a new natural source!

The completion of Stauffer's new Wyoming plant will herald a new, dependable natural source of highest quality soda ash for customers of Stauffer. Supplementing the existing West End Division facilities in California, the new Wyoming plant will greatly expand the area served by West End, the marketing division for Stauffer soda ash. Your plant, in the East or in the West, quite possibly can benefit from Stauffer's multiple source. Let us suggest practical ways you can be supplied economically with bulk or bagged soda ash at your point of consumption. Simply address the coupon below and mail.

Stauffer CHEMICALS

WE ARE INTERESTED IN KNOWING THE BENEFITS TO US OF STAUFFER AS A SODA ASH SUPPLIER.

YOUR NAME_____

COMPANY_____

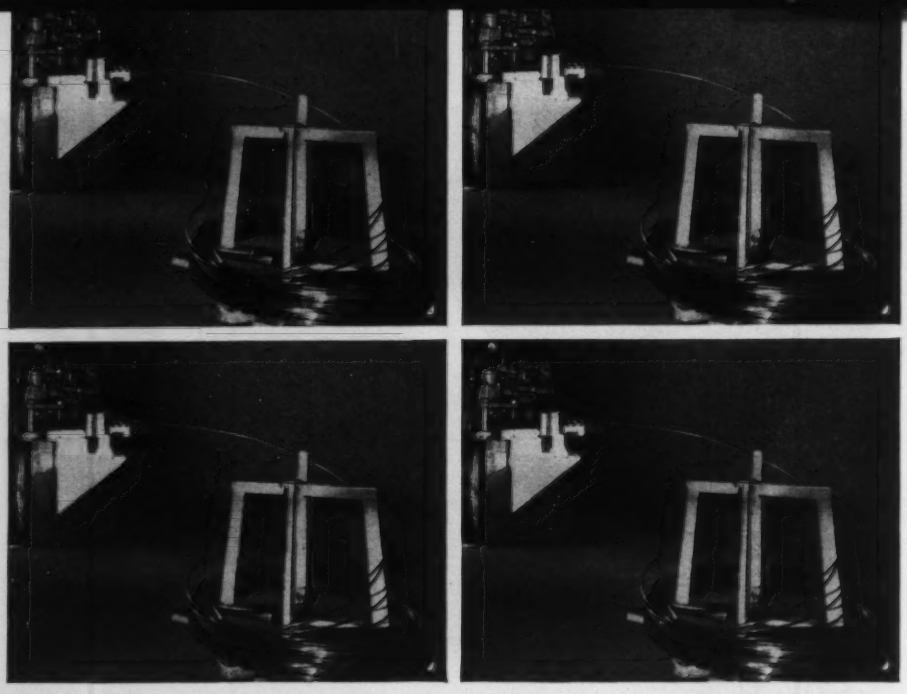
ADDRESS_____

CITY_____ STATE_____

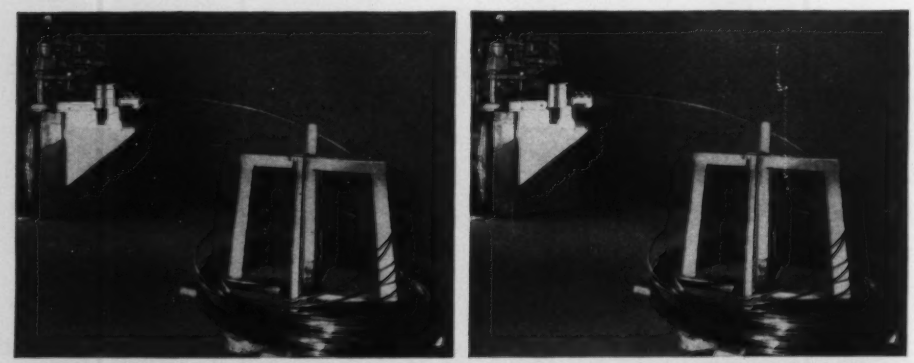
Please mail to West End Chemical Co., 636 California Street, San Francisco, Calif.

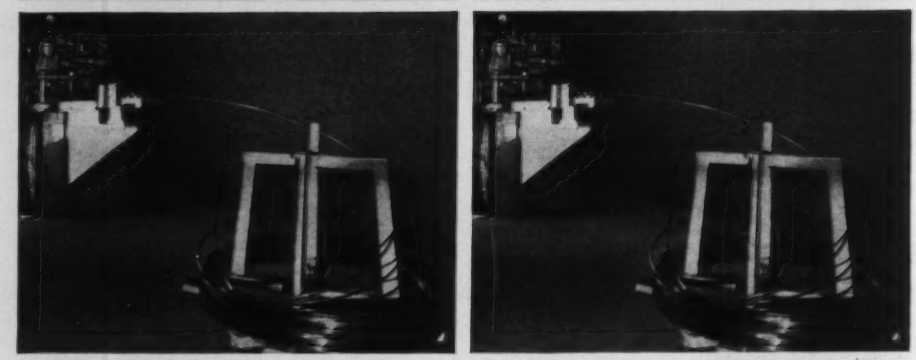
WEST END CHEMICAL COMPANY • DIVISION OF STAUFFER CHEMICAL COMPANY

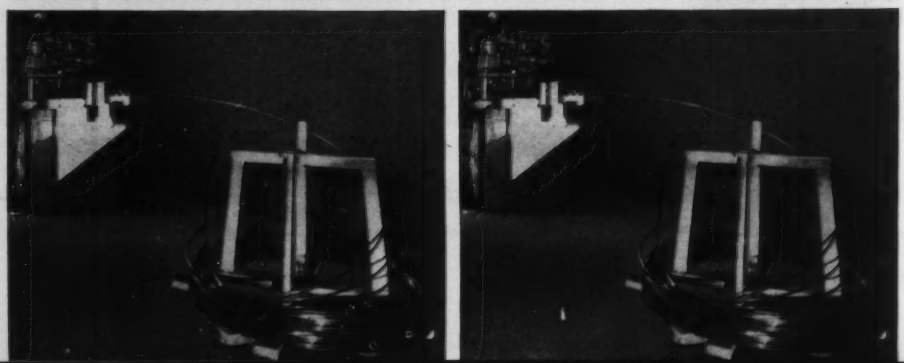
SAN FRANCISCO, 636 CALIFORNIA STREET • CHICAGO, PRUDENTIAL PLAZA • ST. LOUIS 19, P. O. BOX 48

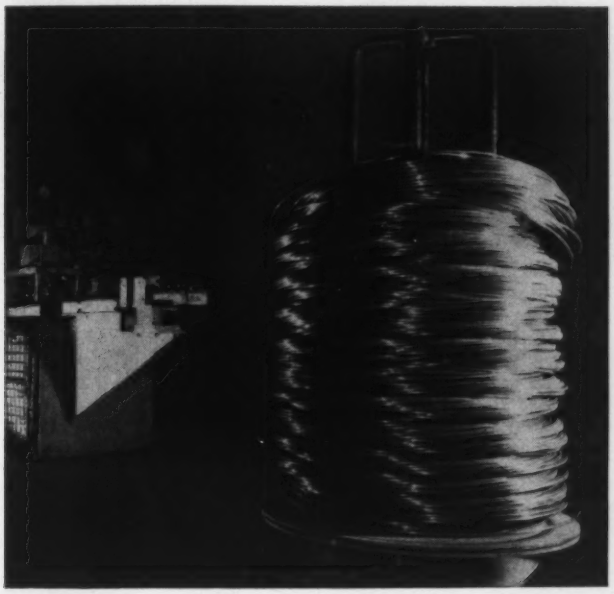


Why set up ten times....









....when once will do?

It's a simple matter to add up the savings heavyweight wire coils can give you. How much time does it take you to shut down a machine and start a new coil through? Multiply that by the number of times you have to do it in an 8-hour shift. Then figure that as much as 90% of that lost time is sheer waste. Because you could be using AS&W heavyweight coils that contain up to ten times as much wire in one continuous length. **Other savings:** less handling, less storage space needed, even lower scrap loss. Heavyweight coils aren't the only road to cost reduction: *American Steel and Wire offers a dozen different wire packages.* One of them is designed just right for your operation. Let us look at your set-up and recommend the best package . . . a simple step to increased production. Call our nearest sales office or write American Steel and Wire, Dept. 1488, Rockefeller Building, Cleveland 13, Ohio.

Innovators in wire

American Steel and Wire
Division of
United States Steel

Which of these parts should be investment cast?

... *All* the parts except the milling machine collet at the top right – which is a "natural" for conventional lathe work. Even the helical impeller the men are examining is best made as an investment casting – the helix is undercut in such a way that no cutting tool could reach inside to remove the metal.

"Naturals" for investment casting are usually parts that are too intricate to be made economically by any other process, or involve alloys or quantities that make them impractical to produce by other methods. In other words, when it looks as if you might have to sacrifice a design because its complexity makes the cost prohibitive, or forego a preferred alloy because it is difficult to machine, then it's time to take a long, hard look at investment casting.

But . . . it's not always as easy as it sounds to spot the parts that are "made" for investment casting. That's where the Arwood sales engineer comes in. He knows Arwood expects him to show a customer how to get the most from the process. To help keep your cost down he may have to suggest a filleted radius here . . . or a tolerance opened up there. Then too, on occasion he may readily have to admit the part should not be investment cast at all. However, he also knows that if you just can't have the part made any other way, Arwood will go all the way down the line to have it investment cast for you.

Our five plants cast every castable metal and alloy, including magnesium and superalloys. Each has its own research, tooling, quality control and production facilities. In short, if it can be investment cast, we can investment cast it.

Machine the simple . . . cast the complex

A complete service from design through tooling, production and finish machining. Seventy-one engineering representatives from coast to coast.

arwood

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PLANTS IN BROOKLYN, N. Y.; TILTON, N. H.; GROTON, CONN.; LOS ANGELES AND LA VERNE, CALIF.

LIKE TO LEARN MORE ABOUT INVESTMENT CASTING?

Write us for a complimentary copy of our 44-page manual, "Practical Guide to Investment Casting." Among other sections it includes practical tips on designing for investment casting, as well as analyses and physical and mechanical properties of all the metals and alloys cast by Arwood.

HOW TO SAVE

You can also gain greater speed and far greater flexibility from a major advance in control computers.

MONEY ON

Stored Logic provides these benefits, and the TRW-530 is the first control computer with Stored Logic.

COMPUTER

Stored Logic in the TRW-530 gives you economy in programming, economy in operating time, economy in memory requirements.

CONTROL

How can Stored Logic work for you? Our engineers will tell you why Stored Logic in the TRW-530 is the money-saving answer to control problems involving integrated control of several shops, mills, and furnaces. Contact one of our offices below.

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a division of
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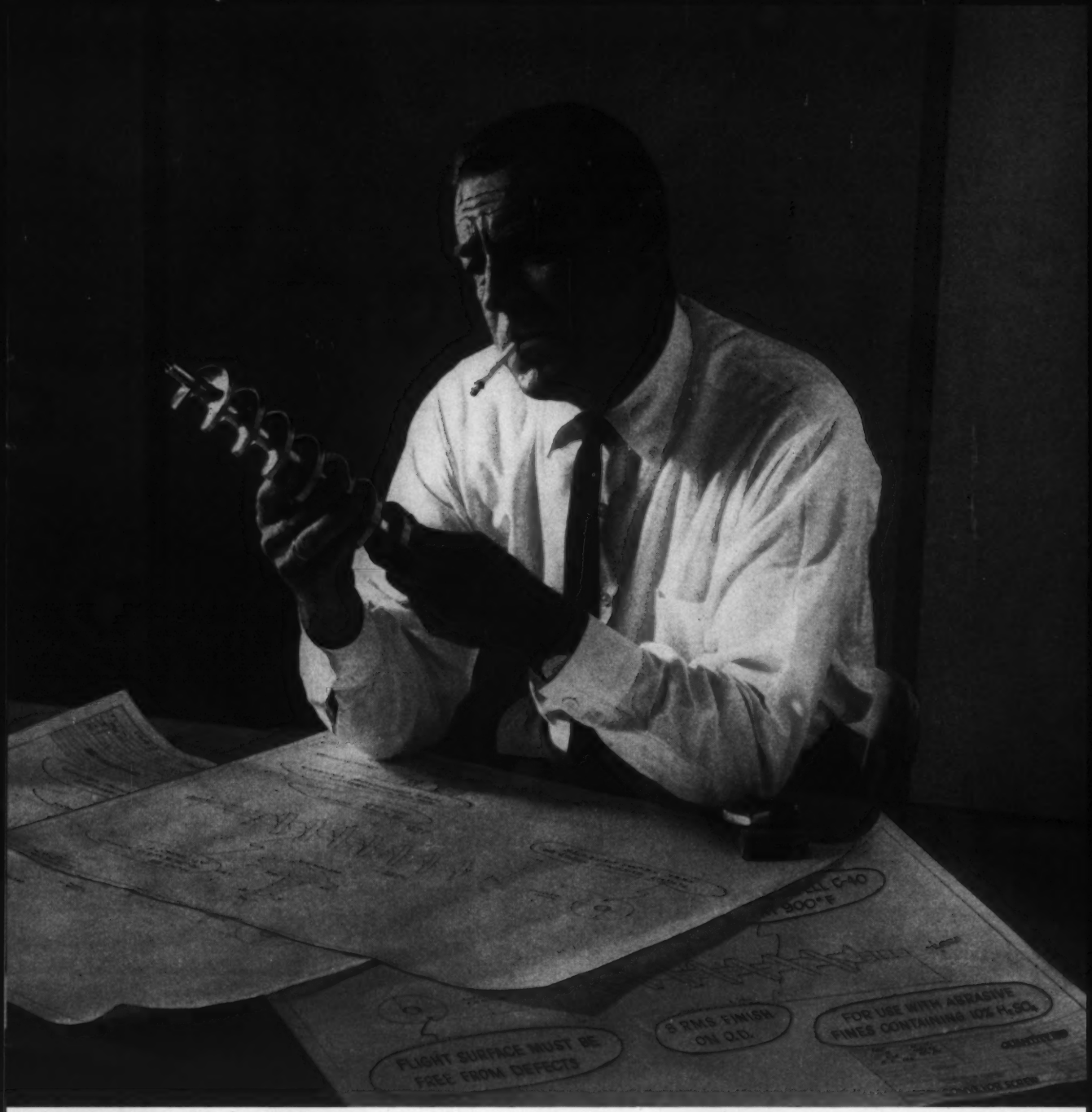

How can I keep this part from going to pot?

Witness a designer with problems. You've had them. Excessive wear. Heat. Corrosion. And a part that goes to pot much too soon.

HAYNES alloys have enabled designers to solve such problems many, many times. They're tough alloys. They resist all the common causes of metal failure . . . many uncommon ones. HAYNES STELLITE supplies alloy parts to the exact size, shape, and finish you require. A few . . . or a million. You can also get HAYNES alloys as rough castings, forgings, bars, or sheet to finish in your own shop.

Got a metal part problem? Don't let it get you down. The key is almost sure to be found in the 32-page properties book on 15 HAYNES alloys. Send for it. Our engineers are at your service, too.

Address Inquiries to Haynes Stellite Company, 270 Park Avenue, New York 17, New York

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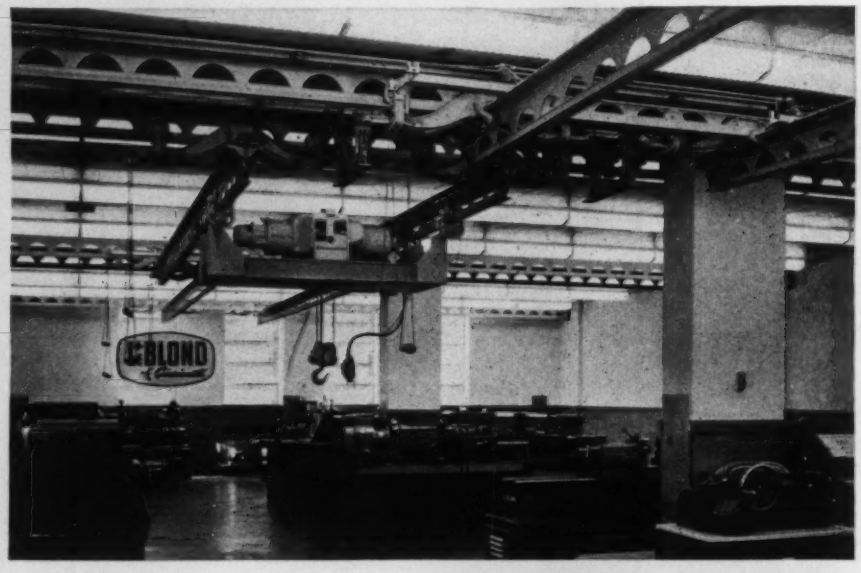
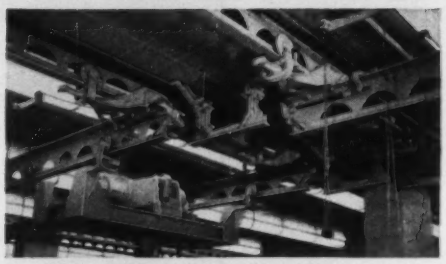
CLEVELAND TRAMRAIL

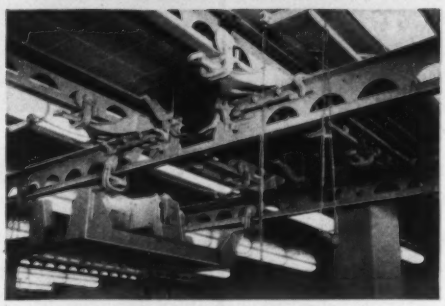
DOUBLE-GIRDER TRANSFER CRANES

OVERCOME LIMITATIONS OF BUILDING COLUMNS, WALLS AND OTHER OBSTRUCTIONS



One section of the modern showroom of LeBlond, the world's largest builder of a complete line of lathes. The three Cleveland Tramrail 4000 lb. transfer cranes shown here can be interlocked with the transfer spurs to permit continuous passage of the trolley from one to the other. Double-girder cranes have greater stability and enable higher lift.





Close-up views of interlock mechanisms. Cranes in upper view are separated and in moving position. In lower view cranes are interlocked with transfer spur. Cleveland Tramrail interlocks permit transfer cranes to lock together automatically without usual time-consuming jogging to line up. Note danger-proof safety forks and heavy overall construction.

Cleveland Tramrail transfer cranes provide handling coverage and efficiency for many situations not possible with ordinary cranes. Areas where handling service is desired can be reached with transfer cranes and materials handled directly, quickly, easily from one crane to another. Transfer cranes of both the double-girder and single-girder types are built by Cleveland Tramrail for manual or electric operation.

An impressive demonstration of Cleveland Tramrail double-girder transfer cranes is in the bright, modern showroom of The R. K. LeBlond Machine Tool Company, Cincinnati, Ohio. Three cranes on separate, parallel runways located between building columns, provide handling coverage for the entire room. Only one crane trolley is used, and this can be transferred from one crane to either of the other two.

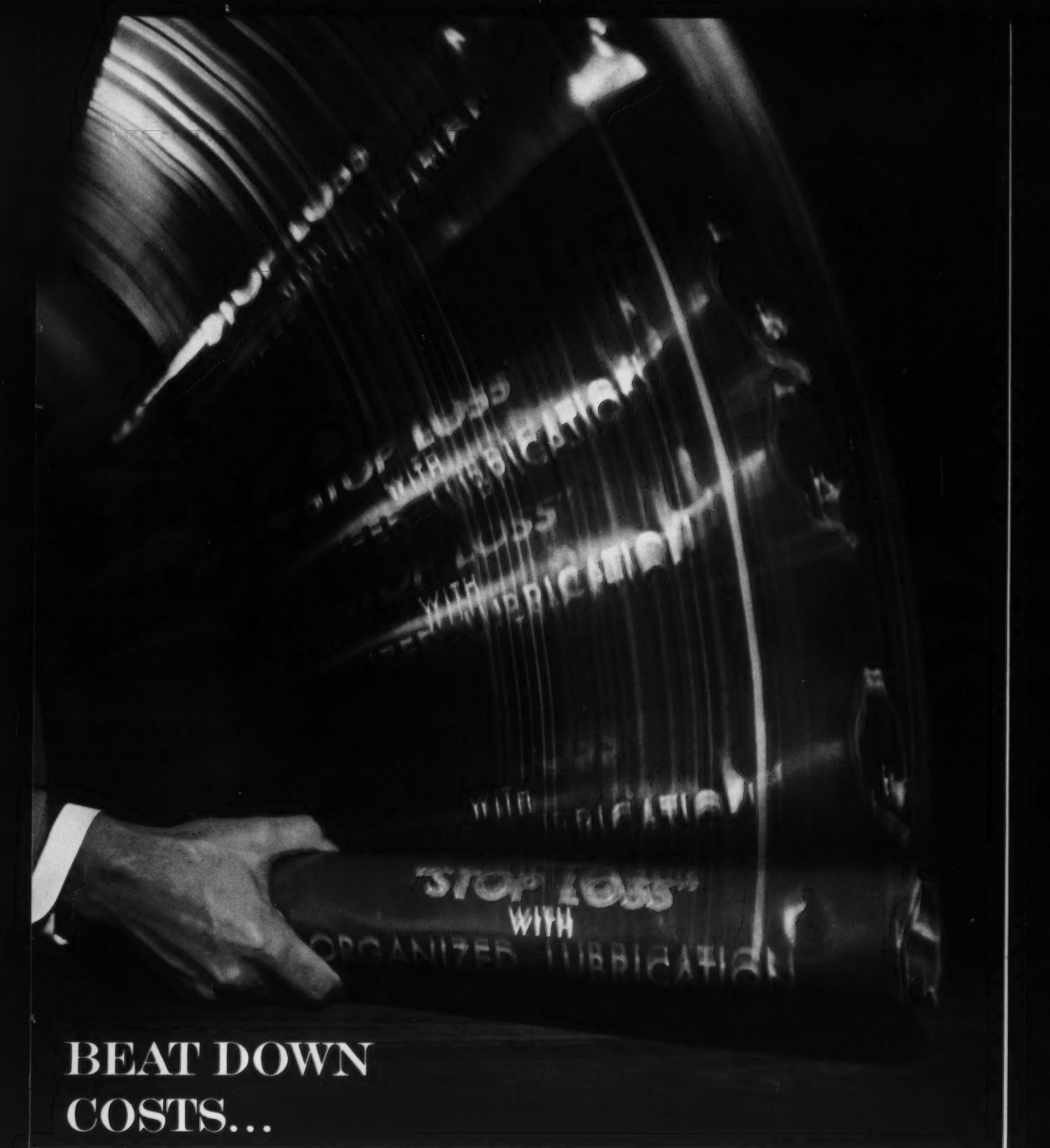
The many advantages of Cleveland Tramrail transfer cranes have been fully proven by thousands of installations.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

Write for free copy of Booklet No. 2008. Packed with helpful information.

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 7865 E. 290 ST. • WICKLIFFE, OHIO



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FOR UP TO 4% MORE NET PROFIT

The Texaco man has a weapon widely used by management caught in a profit squeeze. It's Texaco's "Stop Loss" Program—a new concept of cost control through organized lubrication. Right now, this plan is helping manufacturers everywhere to save. Find out how it can help you cut your maintenance costs by as much as 15%—add as much as 4% to net profits. Write for our informative folder: "How to Starve a Scrap Pile." **TEXACO INC.**, 135 East 42nd Street, New York 17, N. Y. Dept. S-210

HIGH QUALITY WIRE RODS AND WIRE PRODUCTS OF YAWATA EXCELLENCE

Users of Yawata's wire rods and wire products everywhere with critical eyes see quality beyond price. Yawata's high quality wire rods, made of basic open hearth steel, in various grades as specified in AISI and SAE, and in gauges as provided in Japan Industrial Standards and others, are outstandingly uniform in clean surface finish, sizes, roundness, tempers, and analyses. They are shipped abroad in coil length weighing as much as 705.5 lbs. Under the watchful eyes of Yawata's experienced and skilled engineers and workers, broad lines of quality wire products, including bright wires, annealed wires, baling wires, coat hanger wires, galvanized wires, barbed wires, regular nails, cement-coated nails, galvanized nails, roofing nails, screw nails, staples, duplex nails, made from mild and hard steel wire rods, emerge from the modern manufacturing lines destined for the world market, following the severest of tests to doubly assure Yawata excellence in quality.

YAWATA IRON & STEEL CO., LTD.

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European Office: Immerman Strasse 15, Dusseldorf, West Germany Tel: 1-0463
American Office: Room 2009, Seagram Building, 375 Park Ave., New York 22, N.Y. U.S.A. Tel: MUrray Hill 8-3327

TRADE MARK

Multi-Strand, High-Speed Rod Mill

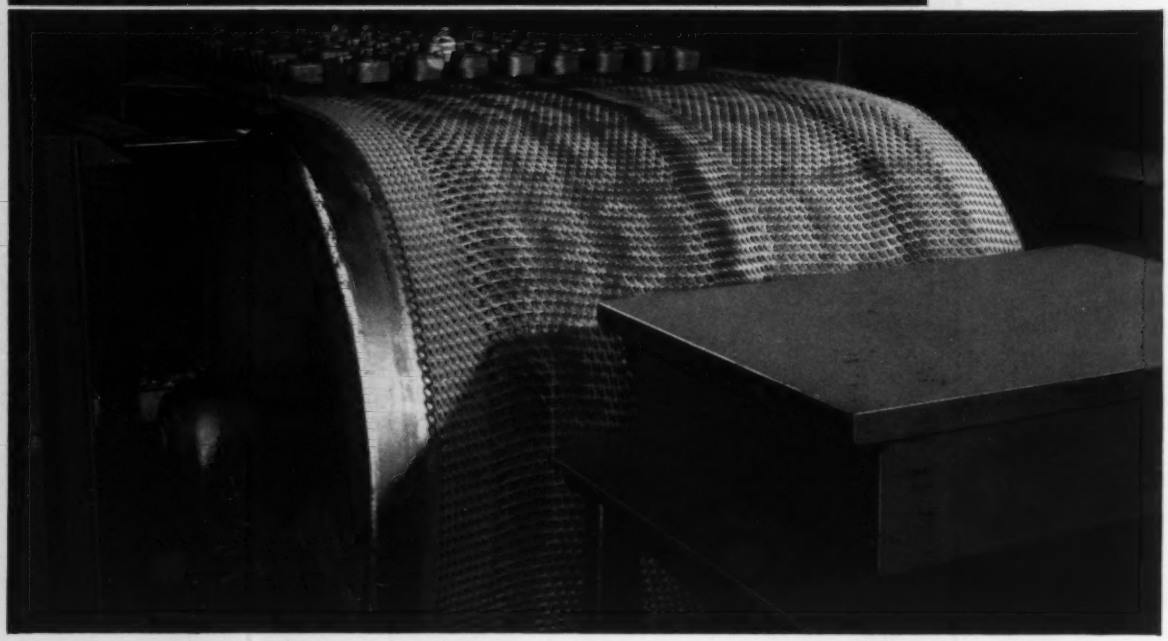
BLAW-KNOX ROD MILLS

Blaw-Knox designs and builds a full range of multi-strand, high-speed rod mills and merchant bar mills. Other Blaw-Knox equipment for the metals industry includes: Complete rolling mill installations and auxiliary equipment for ferrous and non-ferrous metals • Sheet and strip processing equipment • Electrolytic tinning, annealing and galvanizing lines • Seamless pipe and tube mills • Draw benches and cold draw equipment • Blaw-Knox Medart cold finishing equipment • Iron, alloy iron and steel rolls • Carbon and alloy steel castings • Fabricated steel plate or cast-weld design weldments • Steel plant equipment • Heat and corrosion resisting alloy castings • Blaw-Knox Company, Foundry and Mill Machinery Division, Blaw-Knox Building, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.

BLAW-KNOX

Blaw-Knox designs and manufactures for America's growth industries: METALS: Rolling Mills • Steel Processing Lines • Rolls • Castings • Open Hearth Specialties • PROCESSING: Process Design, Engineering and Plant Construction Services • Process Equipment and Pressure Piping • CONSTRUCTION: Concrete and Bituminous Paving Machines • Concrete Batching Plants and Forms • Gratings • AEROSPACE: Fixed and Steerable Antennas • Radio Telescopes • Towers and Special Structures • POWER: Power Plant Specialties and Valves

Cambridge Type-314 Stainless Metal-Mesh Belt



SOLVES CHANGING TEMPERATURE, CHANGING LOAD PROBLEMS

Looking for a low-cost, all-purpose belt? Then look closely at a Cambridge Type-314 Stainless Steel Metal-Mesh Belt. It has the outstanding ability to give long life under widely varying load conditions in both high and medium temperatures. You can use it in 2100° F. to 1850° F. temperatures and get excellent strength characteristics and oxidation resistance. In the 1850° F. to 1600° F. range, it shows superior resistance to green rot. In the 1600° F. to 900° F. range, it shows little or no carbide precipitation.

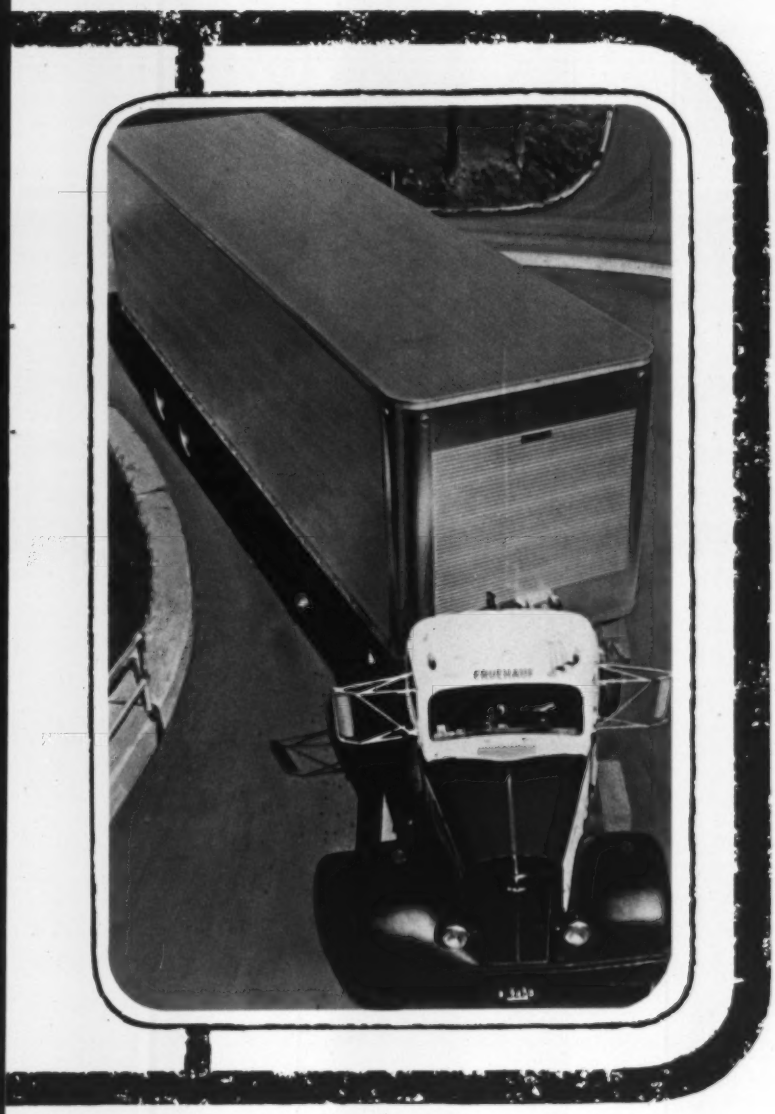
To meet specific requirements, there is a complete line of Cambridge Belts available in special and standard metals and alloys—custom built in any weave to insure the most efficient processing.

Experienced Cambridge Field Engineers—experts in their field—are available to discuss your needs and help you select the belt best suited to your operations. Or, they can offer you sound advice on the installation, operation and maintenance of your Cambridge Belts. Talk to your Cambridge man soon. He's listed in the Yellow Pages under "Belting, Mechanical". Or, write for free 130-page reference manual.

The Cambridge Wire Cloth Co.

DEPARTMENT J • CAMBRIDGE 11, MARYLAND

Manufacturers of Metal-Mesh Conveyor Belts, Flat Wire Conveyor Belts, Wire Cloth, Wire Cloth Fabrications, Gripper® Metal-Mesh Slings



Dollar savings provided by building Volume☆ Vans with USS Cor-Ten High-Strength Steel

Fruehauf Trailer Company works some design magic with USS COR-TEN Brand of High Strength Steel that results in substantial construction savings.

In their stressed-skin trailers, called "Hi-Tensile Volume★ Vans," USS COR-TEN High-Strength Low-Alloy Steel is used for the side and roof panels, angles and rub rails. Welding this steel instead of riveting contributes to lower cost; also welded construction makes Hi-Ten Volume★ Vans strong and sturdy.

Increased strength and rigidity also are obtained by cold-forming COR-TEN Steel side and roof panels with ¼"-deep rectangular corrugations. Angles and rub rails are of USS COR-TEN High Strength Steel, and together with the side and roof panels, add up to a total of only 2,500 pounds in each trailer. COR-TEN Steel also has improved atmospheric corrosion resistance and, as an added bonus, paint lasts much longer on USS COR-TEN High-Strength Low-Alloy Steel.

In transportation equipment USS COR-TEN Steel is noted for its long service life, low first cost and economical operation. Get the real facts on USS COR-TEN Steel from United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS and COR-TEN are registered trademarks.

United States Steel Corporation · Columbia-Geneva Steel Division · National Tube Division · Tennessee Coal and Iron Division · United States Steel Supply Division · United States Steel Export Company

This mark tells you a product is made of modern, dependable Steel.

United States Steel USS

Down go back-up roll costs with

Quality Forged Sleeves

Pictured above is James S. Rennick, a metallurgist with twenty years' experience in the Forgings Division of U. S. Steel. Jim specifies composition, heat treatment, and other processing procedures essential to the production of assemblies as shown in the main picture—a back-up roll that will be used in the cold reduction tin mill at U. S. Steel's Gary, Indiana, plant.

This job points up a curious situation: U. S. Steel is one of the country's leading manufacturers of rolls, and also one of the biggest *users* of rolls . . . a double reason to perfect their performance and reduce their cost . . . just as we did here.

We had to replace a worn, cast steel back-up roll. Rather than replace the entire roll, we machined the face of the roll and shrunk on a *forged* steel sleeve. For back-up rolls like this one, 42" O.D. and larger, this method of sleeving is much less expensive than buying a complete new roll. One arbor can be used for several forged sleeves. A forged sleeve has a hard, wear-resistant surface and is highly resistant to spalling.

Also, the sleeve is purposely produced with a softer bore to develop a desirable stress pattern, and to provide maximum gripping between the arbor and sleeve after assembly.

There is a good possibility that we can help reduce *your* roll costs. Write or call the United States Steel Office nearest you, or United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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TRADEMARK

This mark tells you a product is made of modern, dependable Steel.

"T-1" Steel cuts spiral case weight 45% at Oahe Dam

Oahe Dam will be the world's largest rolled earth dam . . . 9,300 feet long and 242 feet high. It will create a lake 250 miles long on the Missouri River above Pierre, South Dakota. Seven hydro-generators will have a total installed power capacity of 595,000 KVA.

USS "T-1" Steel cuts weight of spiral cases. Water for power generation will flow through seven spiral cases with inlet diameters of 20½ feet. USS "T-1" Constructional Alloy Steel not only met all requirements, but permitted a reduction of about 45% in the weight of the steel used. The total amount of USS "T-1" Steel used was 1,002 tons.

Cost Savings. By using USS "T-1" Steel, with a minimum yield strength of 100,000 psi, plate thicknesses ranged from ½" to 1¼". With carbon steel, they would have been almost twice as thick. Result: large savings in freight costs, erection time, and field welding costs. In future projects, costs might be reduced even more by the use of our new, more economical USS "T-1" type A Steel which has the same strength.

Giant steel tunnel liners, 24 feet in diameter and averaging 2,200 feet long, will carry water for power generation. 20,000 tons of structural carbon steel were used by U. S. Steel's Consolidated Western Steel Division to fabricate 449, 30-foot-long sections for the seven tunnel liners.

The Oahe Dam is being constructed under the supervision of the Corps of Engineers—U. S. Army, Office of District Engineer, Omaha, Nebraska. Powerhouse A-E: Sverdrup and Parcel. Powerhouse contractor: Atkinson-Ostrander Company. Spiral cases were fabricated by the Hydraulic Division of the Allis-Chalmers Manufacturing Company (the supplier of completed turbines), and field-welded and assembled by Chicago Bridge & Iron Company. Generators were supplied by General Electric Company.

For more information write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS and "T-1" are registered trademarks.

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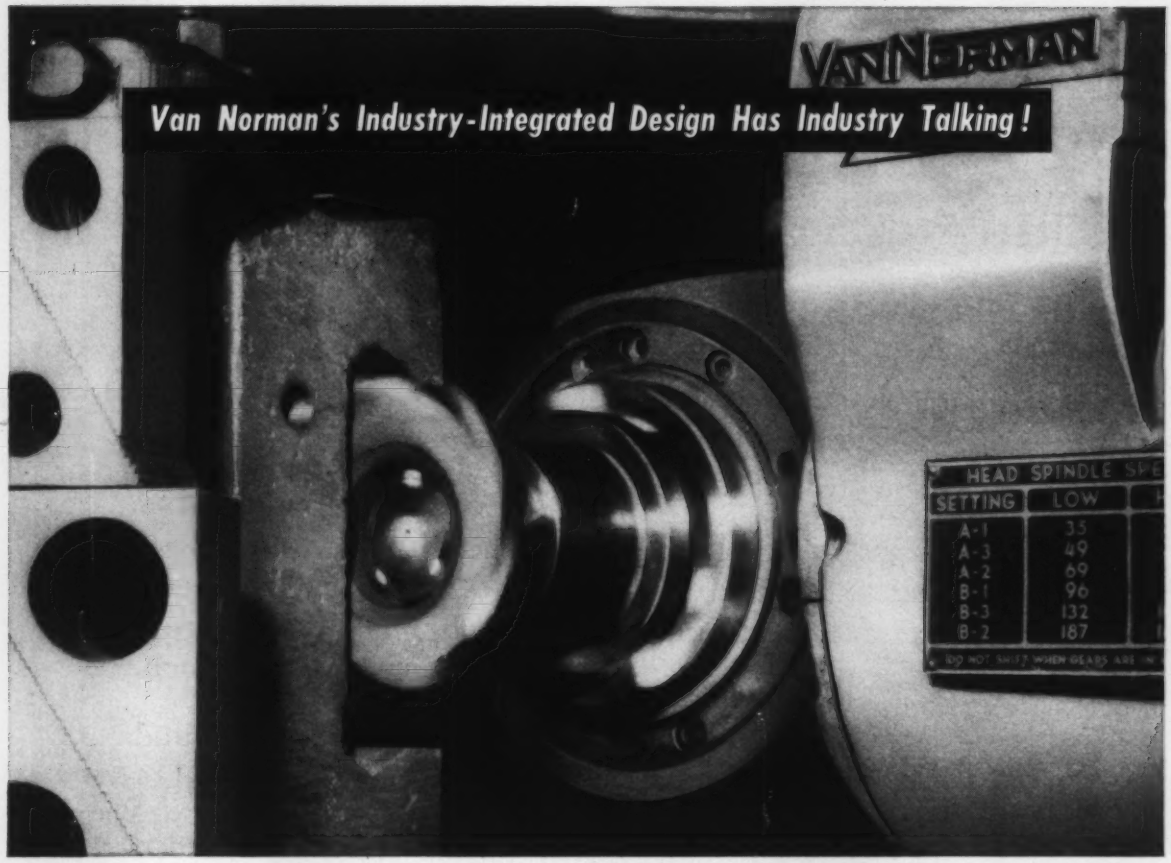
United States Steel



VAN NORMAN RAM-TYPE MILLER SLASHES PRODUCTION COSTS 15% ...SAVES TIME—WILL PAY FOR ITSELF IN 3 YEARS

Adjustable Cutterhead Dovetails and Machines Component Parts—Spindles...Flanges...Castings

A large metalworking manufacturer cut component part production costs 15% when they bought a VN 38 MA Ram-Type Miller. This low-priced, low-maintenance miller replaced three machines formerly needed to get accuracy in the finished work.

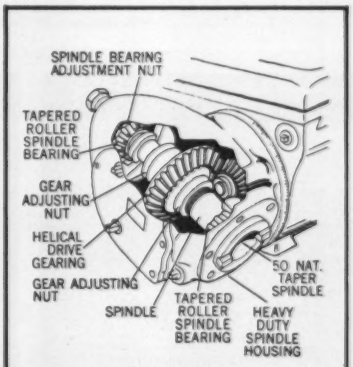
In addition, the 38 MA, because of tremendous range capability, also serves as a jack-of-all trades around the shop. It performs drilling, slot milling, slab milling and face milling while machining to tolerances of .001".

Adjustable Cutterhead Solves Problem—The VN 38 MA features a swivel cutterhead that can be set in horizontal, vertical and any angular location within a 90° angle—locks in position on the ram to guarantee precise cuts within the entire 29" ram range. Full horse power is delivered to spindle *in any position* for maximum cutting efficiency.

With the ram-cutterhead assembly, the company's three-step milling job is finished in half the previous time—and they expect the 38 MA to pay for itself in three years.

Greater Accuracy... Less Downtime—The VN 38 MA is specifically engineered to produce faster—better... at less cost. The addition of a backlash eliminator controls table feed under all conditions.

Get the Complete Facts—Your VN distributor is ready to show you how a VN milling machine can cut costs and speed production in your shop. Call him today.



Cutaway view of Adjustable Cutterhead showing heavy duty construction. Spindle bearings are sealed and lubricated for life.

4232

VAN NORMAN MACHINE COMPANY

SPRINGFIELD 7, MASSACHUSETTS • A DIVISION OF VAN NORMAN INDUSTRIES, INCORPORATED

General Electric Makes Eddy-current-coupling Drives

And they're dependable drives. The complete line includes water-cooled and air-cooled eddy-current couplings. We call them KINATROL* drives. Ratings are from 1 to 150 horsepower, operating from standard a-c power.

A General Electric KINATROL drive is not just another eddy-current coupling. For instance, in the water-cooled coupling, water control is packaged. You'll see much less external piping. Furthermore, the coupling is protected from flooding—and the air gaps are dry, preventing corrosion.

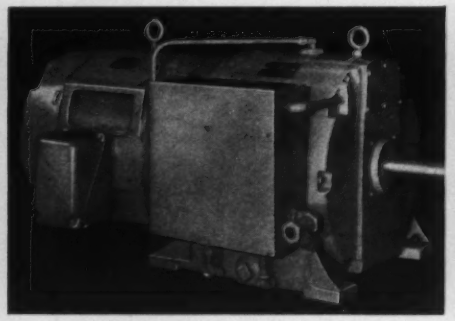
KINATROL couplings are compact, field proven and dependable. General Electric has had a good deal of experience in the engineering, manufacturing, and application of packaged adjustable-speed drives. And we know how important service is to a customer.

KINATROL —a good product, with the kind of service you can depend on. Please call your nearest General Electric Sales Office for further details.

*Trademark of General Electric Company

821-07

AIR COOLED, 7-1/2 to 100 HP



WATER COOLED, 25 to 150 HP

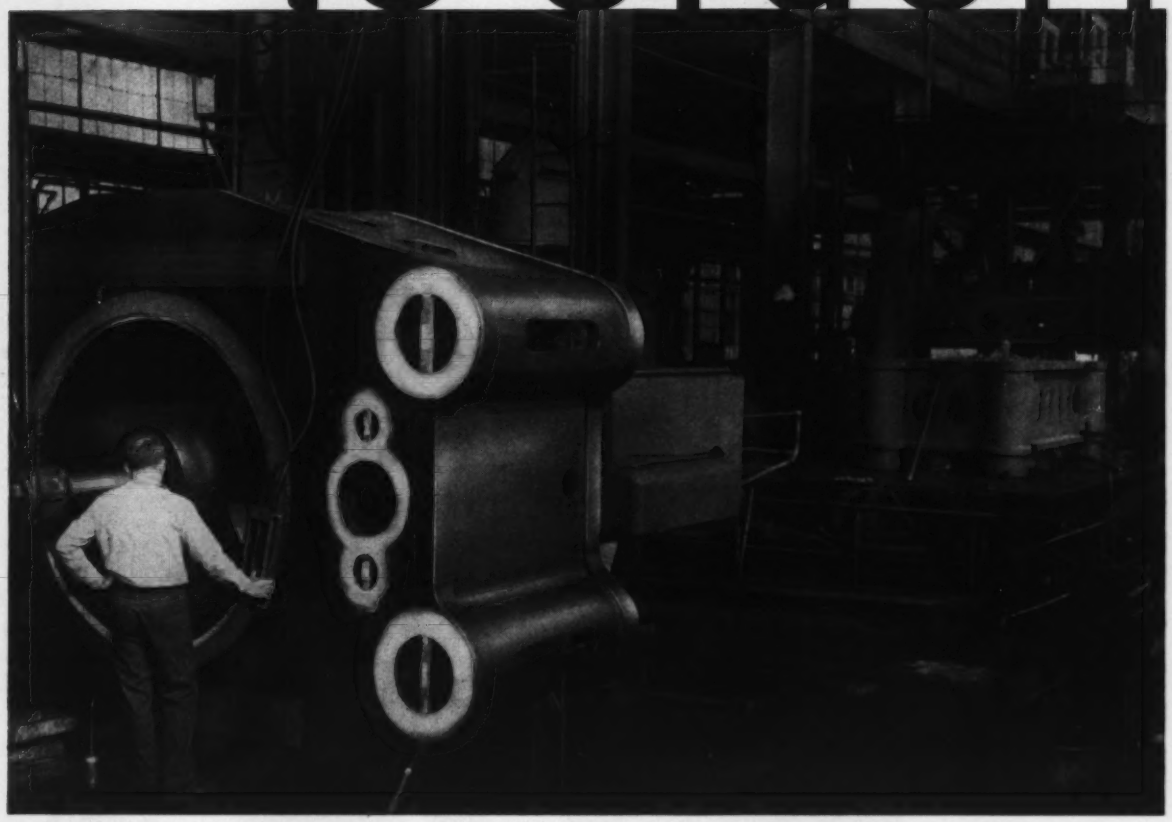
AIR COOLED, 1 to 5 HP

DIRECT CURRENT MOTOR AND GENERATOR DEPARTMENT

GENERAL ELECTRIC

ERIE, PENNSYLVANIA

Build exactly what you want • • • to order!



VERSATILITY—that's the word for Sun Ship. And that's why you get the machinery or industrial equipment you need, built exactly to your requirements, when you specify Sun Ship.

Consider, for example, the machining operations shown above. To the left is a press cylinder being machined on a 72″ Draw-shaper and to the right is a large platen on a 14′ wide Planer. Here we custom-produce a wide variety of machinery or machine components to do difficult jobs in petroleum, chemicals, atomic power—in many fields.

If you would like to investigate the advantages of Sun Ship machine building service, why not contact our Sales Engineering Department now? For information and data on any phase of our service, simply write

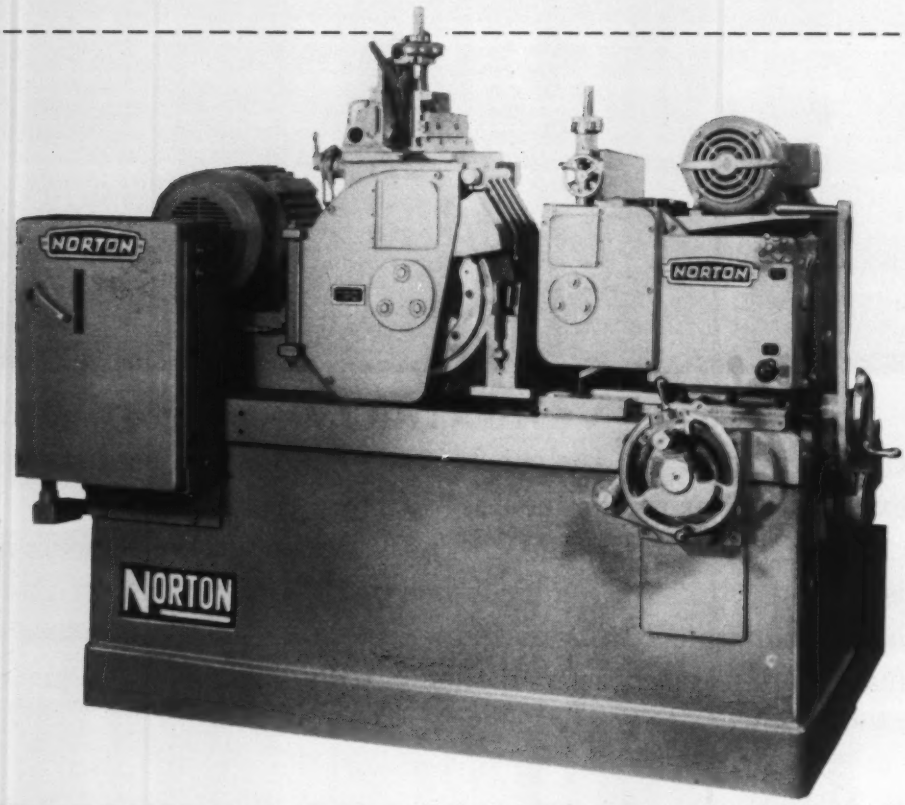
Sun

SHIPBUILDING & DRY DOCK COMPANY

ON THE DELAWARE • SINCE 1916 • CHESTER, PA.

SOLID SUPPORT for the "Touch of Gold"

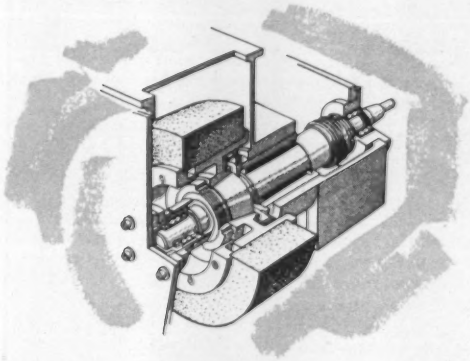
The Norton No. 2 Straddle-Bearing Centerless Grinder is built for productivity...



The new Norton No. 2 Centerless Grinder can be arranged for full automatic, semi-automatic or manual thru-feed or plunge grinding. Capacity includes work diameters ranging from 1/16" to 4 3/4" depending on type of work rest and bar grinding fixture.

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Non-Slip Floors — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

3 MAJOR ADVANCEMENTS IN CENTERLESS GRINDING



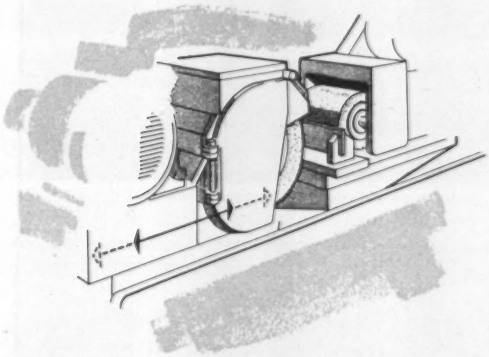
accuracy . . . economy

Straddle-Bearing Spindle Support, in both grinding and regulating wheels, provides extra strength. Combined with the inherent rigidity of Norton spindles this boosts capacity to take heaviest cutting pressures, while permitting fast grinding to close tolerances under all conditions.

Like all Norton grinders and lappers the Norton No. 2 *Straddle-Bearing* Centerless Grinder is built to deliver "Touch of Gold" performance — the Norton extra that adds value to your product while cutting your production costs.

You'll find plenty of proof of that in the modern construction of this newest machine of its type. *Straddle* support of spindle bearings adds strength and ability to take tough jobs . . . the mobile wheel head and constant work-loading alignment make jobs shorter and easier.

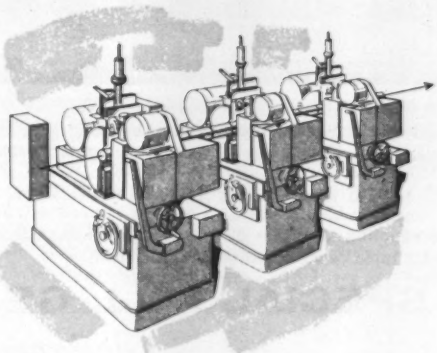
Many other features result in outstanding performance advantages. Call your Norton Sales Engineer, a trained expert in the grinding field, for consultation on how these features can benefit your production. Or write for Catalog 1328. NORTON COMPANY, Machine Division, Worcester 6, Mass.



Mobile Grinding Wheel Head, with wheel mounted between head ways and feed screw located beneath wheel center for ideal balance, provides instant response to signals. This results in especially fast sizing, one of many important advantages over fixed head operation.

NORTON
MACHINE TOOLS

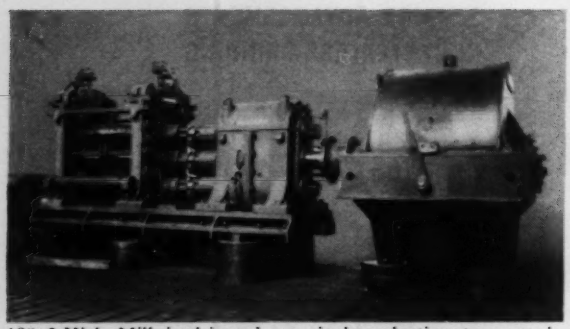
District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit.
In Canada: J. H. Ryder Machinery Co. Ltd., Toronto 18



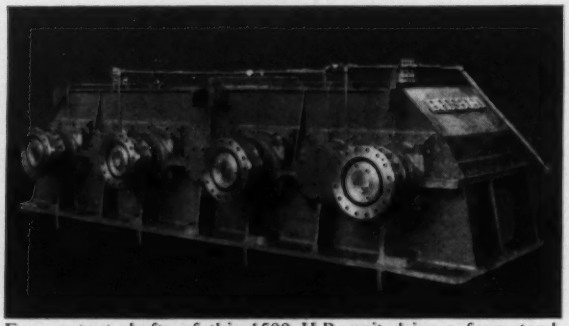
Work Loading Alignment is never disturbed by wear of either grinding or regulating wheel . . . neither is the alignment of the work rest blade. Movable heads for both grinding and regulating wheels make this advantage possible . . . and especially time-saving in a battery set-up.

Making better products . . . to make your products better

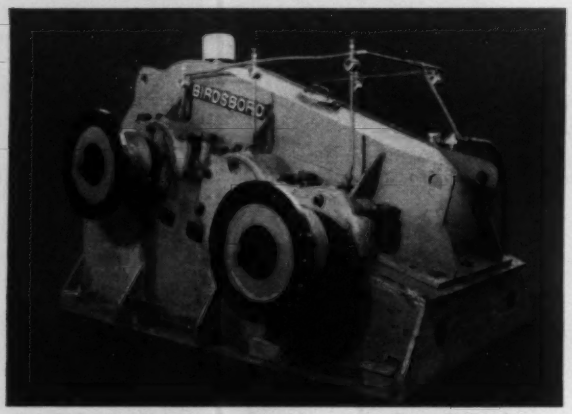
MACHINE TOOL DIVISION: Grinding and Lapping Machines — G & E DIVISION: Shapers • Gear Cutting Machines



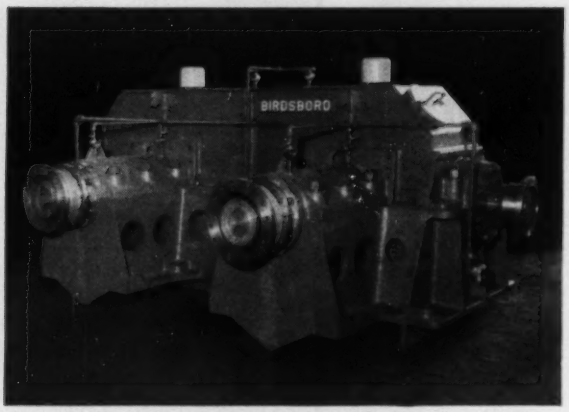
18" 3-High Mill is driven by a single reduction two speed, 1,000 H.P. Gear Drive. Speed changes are made by manually shifting a jaw type clutch on the output shaft.



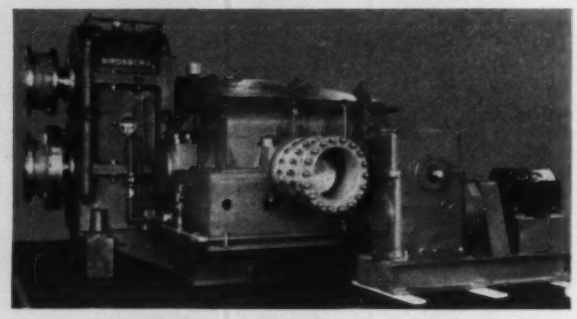
Four output shafts of this 1500 H.P. unit drive a four stand Continuous Mill with the proper speed increase for each stand.



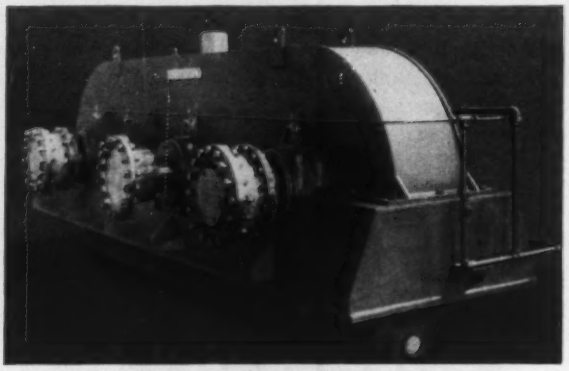
900 H.P. Single reduction double output Gear Drive is contained in a welded steel case. Output shafts on two levels, permit low floating shaft to pass beneath repeater to next stand of Cross Country Mill, driving mill in opposite direction.



Two 400 H.P. motors can transmit their entire power to either drive, for rolling heavy sections, or by disconnecting the bevel gear units each motor can drive a stand independently for looping.



A 3000 H.P. Drive has two output shafts for driving two 20" Mills, one directly and one through a low shaft and four-high Pinion Stand. First reduction is spiral bevel to conserve space in mill building. Second reduction has two ratios with a gear tooth clutch to give alternate output speeds of 76 RPM, or 155 RPM. Inching drive is provided to back out cobbles, and to facilitate coupling up. This drive is connected through air disc clutch for rapid remote controlled engagement.



A single 1250 H.P. motor drives a three stand 14" Cross Country Mill through a single reduction herringbone gear train. All gearing is carried on anti-friction bearings and lubricated by circulating oil for long, wear-free service.

SPECIAL MILL GEAR REDUCTION UNITS

designed and built by

MM 5-61

BIRDSBORO

CORPORATION BIRDSBORO, PENNSYLVANIA

STEEL MILL MACHINERY • HYDRAULIC PRESSES • CRUSHING MACHINERY • SPECIAL MACHINERY • ROLLS • ELECTRIC STEEL CASTINGS: Carbon, Low Alloy and STAINLESS STEEL

DIVISIONS: **MIRAWAL DIVISION • CHEMICAL MACHINERY DIVISION**

Batch type furnaces form mechanized heat treat line

At The Harnischfeger Corporation, one man can supervise a group of standard heat treat units linked with a shuttle buggy which moves parts quickly and easily from process to process.

Production rate is 460 net pounds per hour of pinions, gears, rollers, shafts, and pins. Chief reason for this is the Surface atmosphere Allcase® furnace. No matter how dense the load, this Power Convection furnace automatically hardens and delivers parts with uniform quality.

Other standard Surface units include two tempering furnaces, two atmosphere generators, and an Autocarb® system which automatically controls the carbon content of gas atmosphere.

Write for information: 2385 Dorr St., Toledo 1, Ohio. In Canada: 2490 Bloor St., West, Toronto.

SURFACE

SURFACE COMBUSTION, Toledo 1, Ohio/ a division of Midland-Ross Corporation MR

An outstanding line of LOUIS ALLIS adjustable-speed drives from ½ to 2500 hp.

Louis Allis offers you a complete line of adjustable-speed drives with various characteristics for every application where adjustable speed is required.

Experienced Louis Allis field engineers, supported by regional and factory industry specialists, will help you select the best drive or drive system to meet *your* requirements.

The Louis Allis line of drives provides outstanding control features ranging from simple manual to precise electronic or transistorized control. Selection of control varies, of course, with the nature of the installation and the precision required. Where desirable, speed regulation as close as .1% is obtainable.

Controls can be provided which automatically respond to temperature, pressure, or flow. Other control features include threading, inching, jogging, logarithmic acceleration, torque-limit acceleration, tachometer feedback... and many other control provisions that can exactly tailor a Louis Allis drive to *your* operation.

For process plants or applications involving inter-related motors and multiple drives, Louis Allis engineers can provide complete "systems engineering," furnishing all electrical rotating components and control.

For expert assistance, call your local Louis Allis District Office listed in the Yellow Pages under "Electric Motors"... or write direct to The Louis Allis Company, 471 East Stewart Street, Milwaukee 1, Wisconsin. Ask for Bulletin 2900, "Louis Allis Adjustable Speed Drives."

*TM EATON MFG. CO.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

ASD-238

WE'RE PUTTING OUR MONEY WHERE OUR MOUTH IS!

WITH A 90-DAY MONEY-BACK GUARANTEE ON THE NEW PRATT & WHITNEY TAPE-O-MATIC DRILL

$8,595

1½ HP. Big 30" x 20" table.
Simultaneous positioning of both axes.
(3 HP. optional at extra cost.)

NOW! FOR THE FIRST TIME A NUMERICALLY CONTROLLED DRILL FOR ONLY $8,595 GUARANTEED TO REDUCE YOUR DRILLING COSTS

At last . . . a drill with the finest, transistorized, numerical-control system available for only $8,595 . . . because P&W brings mass production to the machine tool industry for the first time . . . yet maintains the 100-year tradition of P&W quality.

The TAPE-O-MATIC enables **you** to benefit from numerical control . . . to gain a vitally-needed, important competitive edge.

WE BELIEVE IN THIS NEW DRILL SO STRONGLY THAT WE OFFER:

1 90-DAY, MONEY-BACK GUARANTEE. If by 90 days after purchase, this drill has not reduced your drilling costs, return it for refund, less transportation costs.

2 5-YEAR WARRANTY. We fully warrant the TAPE-O-MATIC drill against defective parts and workmanship for 5 years from date of purchase.

3 UNIQUE TERMS. You can buy TAPE-O-MATIC using our exclusive Trade-in Plan. You can purchase the drill outright, lease it, or lease it with option to buy. ONE PER CENT CASH DISCOUNT FOR PAYMENT IN 10 DAYS.

Call collect . . . your local Pratt & Whitney representative, now! Or write to: Paul N. Stanton, Vice President Marketing; Pratt & Whitney Co., Inc.; Charter Oak Blvd.; West Hartford, Conn.

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A MAJOR INDUSTRIAL COMPONENT OF
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HEADQUARTERS FOR AMERICA'S WAR AGAINST OBSOLESCENCE

LINE GUARD

Amchem's new program to insure the highest uniform quality from Amchem's metal treating processes

LINEGUARD is Amchem's industry-wide program for providing automatic sensing and control equipment as an integral part of many of Amchem's metal treating products and processes—cleaners, etchants, chromates and phosphates for spray or dip application.

AMCHEM LINEGUARD functions as an electronic watchdog on your pre-paint process, takes all the guesswork out of providing *sustained* uniformity of coating throughout the workday; eliminates previously costly maintenance and control procedures, releases personnel to more productive tasks.

AMCHEM LINEGUARD—if you fabricate and coat metals, remember the name! It's your key to a new kind of quality control that assures greater coating uniformity, substantial dollar savings in maintenance and manpower.

AMCHEM LINEGUARD is practically a necessity if your operation is geared to high volume, mass production output. For maximum quality at minimum cost ask your local Amchem Representative about LINEGUARD, or write direct to Amchem where metal protection means more than just chemicals!

AMCHEM **AMCHEM PRODUCTS, INC.**

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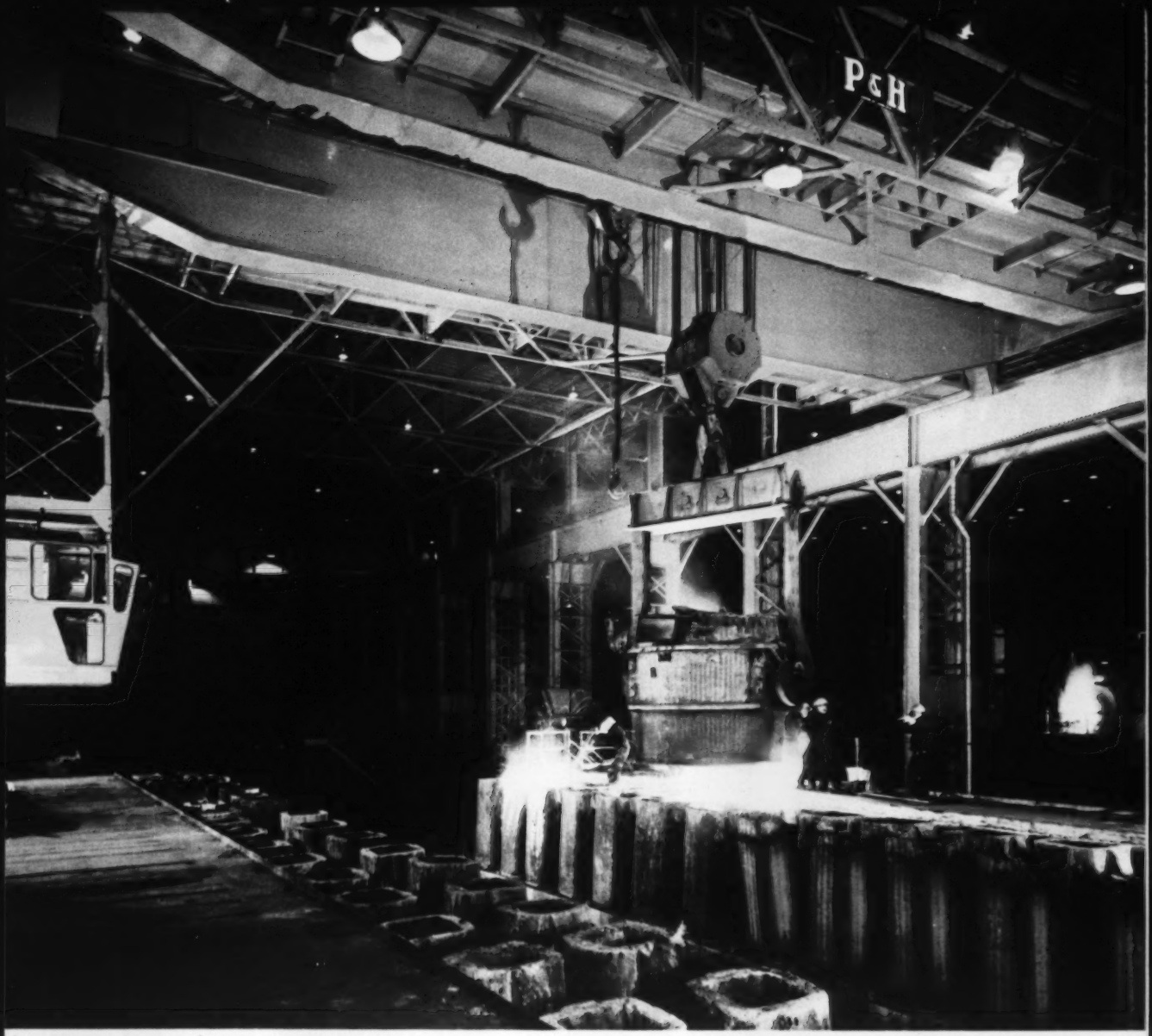


Photo Courtesy Acme Steel Company, Riverdale, Illinois.

FOR EVERY APPLICATION, THERE'S ONE CRANE OUTSTANDING . . . P&H!

IN STEEL MILLS: This 100-ton P&H crane lifts, transports and "spots" tremendous loads of molten steel as surely and deftly as you handle a coffee cup.

P&H steel mill cranes perform tasks like this effortlessly and dependably because they are specifically designed for steel mill service . . . to handle massive loads, withstand searing heat, ignore frequent shock loads.

What's more, P&H carefully engineers every crane to meet specific job requirements . . . to consider all factors affecting performance. Special operating problems are taken in stride. Result: P&H cranes chalk up almost unbelievable service records month after month, year after year, decade after decade.

Isn't this the kind of performance you want, too? Write for bulletin C-42 to Dept. 120, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

Offices in major cities . . . see Yellow Pages

HARNISCHFEGER
Milwaukee 46, Wisconsin

P&H
OVERHEAD CRANES

P&H enclosed cabs have full-view safety glass windows, for unrestricted view of work area. Cabs can be heated and air conditioned where cold, heat, smoke or fumes render ordinary cabs uncomfortable or unsafe.

Photo Courtesy Wacho Mfg. Co.

6000 ORDERS A DAY DON'T TIRE A ZIP-LIFT

An operator's thumb punches over 6000 commands a day into this production-line P&H Zip-Lift in a painting, coating, and tinning plant. The sturdy hoist responds promptly . . . never tires . . . and comes up asking for more.

The control pendant on a Zip-Lift operates on a safe 24-volt circuit — typical of the many safety features P&H builds into this low cost unit. There are two brakes, either of which will hold a capacity load even if power fails . . . shrouded load-block to protect workers hands . . . limit switches that guard against equipment abuse . . . and many more features that make P&H Zip-Lift hoists extra-safe and extra-dependable.

Are you guarding your personnel and your production with P&H Zip-Lifts . . . or are you going to start with your very next hoist purchase? Bulletin H20 will help you plan that purchase. It's free from Dept. 202, Harnischfeger Corp., Milwaukee 46, Wisconsin.

Offices in major cities . . . see Yellow Pages

HARNISCHFEGER
Milwaukee 46, Wisconsin

P&H
ELECTRIC HOISTS

Wire Rope Manufacturers: Save $99,400 Per Year!

A comprehensive study of N&W territory, by Fantus Area Research, revealed ideal sites for wire rope plants. Estimated operating costs at these sites were compared with actual operating costs of wire rope plants around the nation. Result: at the N&W sites a wire rope plant can save $99,400 a year. Want details? Write on company letterhead to H. P. Cotton, Assistant Vice President, Norfolk & Western Railway, Roanoke, Va.

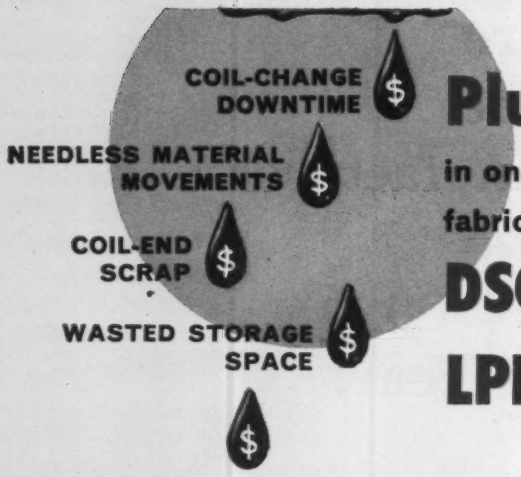
Many Other Types of Plants can cut costs in N&W territory. Write and see if your company is among them.

N&W

NORFOLK and WESTERN RAILWAY

GENERAL OFFICES • ROANOKE, VA.

Nation's Going-est Railroad



Plug these Profit Leaks

in on-again, off-again brite-wire fabricating with

DSC Long Production Run LPR® Coils

HERE'S WHAT USERS SAY after switching from conventional short-run coils (150 to 400 lbs.)

PHOTO CREDIT:
G. E. DISHWASHER DEPT.,
LOUISVILLE, KY.

DOWNTIME due to coil changing cut as much as 95%; productivity stepped up 20 to 33-1/3%; man-hour costs trimmed 20% and more. SCRAP slashed in direct ratio to coil changes eliminated per job-run (50 to 95%).

HANDLING EFFICIENCY boosted through fewer and faster material movements for equivalent tonnages; unloading time alone cut as much as 80%.

SPACE UTILIZATION improved from 25 to 75%. Example: 120—300 lb. coils, total weight 18 tons, required 180 square feet of floor space; the same weight in 12—3000 lb. LPR's took 45 square feet—only 25% as much. Free-standing LPR's can be compactly and safely pyramided for maximum get-at-ability; helps sharpen your inventory management, too.

IN ADDITION: With free-standing LPR's you can dispense with small racks and returnable carriers . . . You avoid the bother of caring for vendors' property and save freight costs, too.

Enjoy these EXTRA BENEFITS at NO EXTRA COST

Let us give you the fabricating facts on LPR's. If you wish we'll demonstrate what LPR's can do in your own shop, under your own operating conditions. Or, we'll arrange for you to talk your problems over with our own mill people and also let you see how we use LPR's in our Welded Wire Fabric plant—a man-size operation.

Call your nearest DSC Customer "Rep" or write: DETROIT STEEL CORPORATION, Box 7508, DETROIT 9, MICHIGAN

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Detroit Steel Corporation—General Sales Office, Detroit 9, Michigan
Cable Address DETROSTEEL—New York

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Speak Up

The foreman picked up his telephone and dialed an extension number. He listened for several minutes, then hung up, without saying a word.

Other employees of Maytag Co., the Newton, Iowa, laundry appliance manufacturer, followed the same procedure daily during negotiations on a new labor contract—it was signed early this month.

They were listening to a recorded report of the previous day's bargaining by Vice President E. F. Scoutten.

Maytag was practicing good communications, characterized by these four essential qualities:

1. Information was given quickly and fully, short-circuiting the company grapevine which is so often inaccurate and incomplete.

2. The report came from top management. It had authority.

3. The data were credible. Mr. Scoutten reported the union and company positions.

4. The service was continuous. A report was given every day there was anything to report. It was part of a general and continuous communications program.

Industry's communications often violate one or more of those precepts. As a result, we're probably wasting much of the estimated $500 million we spend annually to tell our employees and other interested people about our company, our industry, and our free enterprise system (Page 69).

Industry's frequent failures in communications have led one executive to say:

"Our need is for managements willing to fight for basic principles. Little by little, we have surrendered to union leaders intent on possessing our employees completely and destroying our influence with them. Management must speak up and be counted in, or keep quiet and be counted out."

John S. Morgan

ASSOCIATE MANAGING EDITOR

What the flatware story means to you

PHOTO BY ROBERT C. HOFFNER

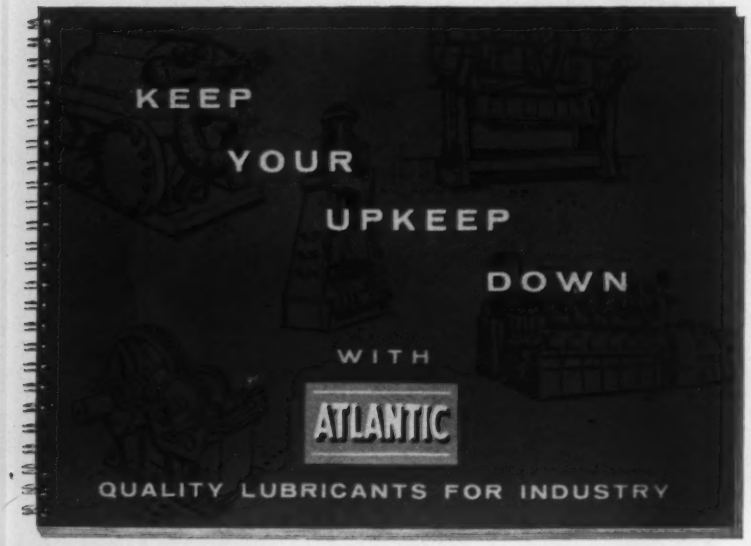
The elegance and exquisite beauty of Stainless Steel is steadily gaining in favor with the manufacturers of flatware. America's leading tableware craftsmen are specifying Sharon Stainless Steels more than ever. They find it easy to work with and like the natural patina it develops with age and use. In fact, they have found it to be the answer to the threat of foreign imports. For lasting durability, with an accent on product beauty, you'll be sure to find other manufacturers of high quality products also thinking Stainless Steels . . . and specifying them from the *Sharon Steel Corporation, Sharon, Pennsylvania.*

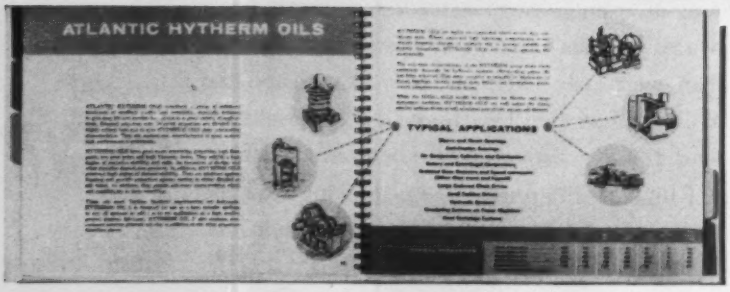
SHARON *Quality* **STEEL** SHARONSTEEL

AMERICA'S FOREMOST PRODUCER OF LIGHT STEELS

Free to lubrication engineers and buyers

A NEW 60-page booklet that simplifies selection of the best lubricants for your needs. The Atlantic Refining Company has prepared this handsome new booklet as a modern guide to good lubrication. Called, "Keep Your Upkeep Down with Atlantic Quality Lubricants for Industry," it gives complete information—including typical properties and applications. For easy reference, the products are classified and color coded according to their basic functions. And of special interest to lubrication engineers is a correlation of lubricant viscosity with speed, radius and clearance, which provides a quick, practical way to determine suitable viscosity for journal bearings. Whatever your lubricant requirements, you're sure to find this comprehensive booklet a useful addition to your reference files. For your free copy, simply write to The Atlantic Refining Company, 260 South Broad Street, Philadelphia 1, Pa., giving your title and company name. We'll see that your booklet reaches you without delay.





ATLANTIC

THE ATLANTIC REFINING COMPANY • Philadelphia, Pa. • Providence, R. I. • Syracuse, N. Y. • Charlotte, N. C. • Pittsburgh, Pa.

"On the national level, steel doesn't have true collective bargaining. It's more like Greek tragedy.

"First you hear rumblings off stage by the union chorus voicing vague demands. Then on the other side you hear the management chorus chanting about the need to hold the line.

"Eventually, the two sides get together and say the same things face to face, but in greater detail. All the while, they're glancing off stage. They're both waiting for the deus ex machina—the federal government—to come in to break the impasse."—**Edward L. Cushman, vice president, American Motors Corp.**

Greek Tragedy Coming in Steel?

ALTHOUGH the steel labor contract doesn't expire until June 30, 1962, and although direct bargaining probably won't begin until next May, the rumblings are already coming from the wings.

THE UNION CHORUS

Top United Steelworkers officials are making it clear that they expect a shorter work schedule without loss of pay to be a chief goal in the negotiations.

"We will press with all the vigor at our command to bring this about," USW President David J. McDonald told District 16 members. He said a shorter schedule "may become a reality a lot sooner than some people think."

Howard R. Hague, USW vice president, told the members that the outlook "for harmonious negotiations next year is dim."

The union's secretary-treasurer, I. W. Abel, carried the rumblings directly to management early this month in speaking to a Management Institute and Labor Advisory Board Conference in Cleveland:

"Members of the United Steelworkers are not going to sit uncomplaining when they see profits skyrocket because of increased productivity . . . and such increased productivity being reflected only in greater dividends to stockholders at the moment . . . or plowed back into new automated plants and machinery which will displace even more workers and bring about even greater productivity and profits."

THE MANAGEMENT CHORUS

Management hasn't been silent either. Joseph L. Block, chairman of Inland Steel Co., warned the Controllers Institute of America:

"The outlook for improvement in the profitability of the (steel) industry is bleak indeed if the strength of a powerful union, aided and abetted by government, continues to be used to push wage and benefit increases beyond the long range average in national (even industry) productivity gains . . ."

And R. Heath Larry, administrative vice president-labor relations, U. S. Steel Corp., told the Texas Personnel & Management Association:

"We see leviathans of the labor movement warring amongst each other to see who may wrest from the other the privilege of exacting dues and initiation fees from the occupants of various jobs. We see instances in which unions have waged such a battle against progress and efficient utilization of men and machines in the industries whose employees they represent . . . Doubts begin to arise as to whether those industries can survive and have employees at all."

ACT III

Will the *deus ex machina* function in 1962?

Arthur J. Goldberg, secretary of labor, has been quoted as saying this about the 1959 steel strike, when he was serving as chief counsel and chief strategist for the union: "The whole thing was a sorry mess. I criticized the government then, and I criticize it now for letting the strike go on much too long. The recession we have just been through was in large part set off by the length of the steel strike."

DENOUEMENT

Does all this suggest that we'll have another Greek tragedy in steel next year?

Modernization of U. S. production lines termed vital . . .

Tool Builders Urge Tax Reforms

MORE aggressive action by U. S. firms to win foreign markets and boost domestic business was urged by speakers at the 60th annual meeting of the National Machine Tool Builders' Association last week in Miami Beach, Fla.

The major theme: A plea for modernization of U. S. production lines to provide more jobs and meet foreign competition.

• **Keynoter**—Outgoing president of the association, Everett M. Hicks, vice president and general manager, Norton Co., Worcester, Mass., expressed concern over the "extremely rapid rate of industrial growth which is taking place elsewhere, while the U. S. is remaining relatively stagnant." He noted that foreign builders of machine tools were running at capacity and that backlogs of two years or more were common.

"Our industry has always been strong in exports," he commented, "but we find it increasingly difficult to sell abroad because of the improved products available from the Western European countries whose costs and prices are a fraction of our own . . . One way to offset high wage costs is to strive for increased mechanization and automation—although it is doubtful whether this source alone can bring our cost levels down sufficiently." He observed that foreign companies were installing highly automatic factories and that we would have to do a great deal of modernization to remain even.

• **Depreciation**—Mr. Hicks reviewed the pros and cons of the tax credit plans proposed by President Kennedy and suggested looking over other possibilities such as the English "investment allowance" approach to facilitate modernization. "It has the same effect as a tax credit," he said. "It is an additional depreciation allowance for encouraging people to buy new equipment."

FRANCIS J. TRECKER
NMTBA's new president

• **New President**—The tool builders elected Francis J. Trecker, president of Kearney & Trecker Corp., Milwaukee, to succeed Mr. Hicks as president of the association.

UAW Bets on Security

SOME labor observers suggest that the recently concluded labor talks between the UAW, the Big Three automakers, and American Motors Corp. may contain the seeds of the union's destruction. Others think that the UAW has won its biggest victory in years.

• **More Money** — The UAW won direct wage increases averaging 6 cents an hour annually over the three year life of the contract. It gained at least another 5 cents yearly in benefits. Most labor experts feel the contracts are inflationary.

Supplemental unemployment benefits are extended to 52 weeks, and a pay plan for unscheduled short workweeks has been instituted. The two provisions add up to a guaranteed annual wage. Pension benefits have been boosted, and insurance is virtually company paid.

AMC's progress sharing plan puts hourly labor in the position of directly benefiting from profits. This is an incentive concept which marks a reversal of traditional union philosophy; it allies labor with management and stockholder goals.

• **Outlook**—Those who argue that the gains may add to Walter Reuther's long range problems reason this way: The contracts boost the cost of a manhour of labor to the point where management is more eager than ever to cut labor costs by installing automatic equipment. That means fewer job opportunities, particularly for younger workers with little seniority protection. Fewer workers mean fewer UAW members unless the union can tap whitecollar workers and similar nonorganized groups. So far, its efforts in that area have been unspectacular. UAW dues payers have dropped from 1.3 million to 1.1 million in less than five years.

On the other hand, others believe that the security gains for today's workers insure a more stable work force. This should benefit the companies in long range production planning. To create more jobs for younger workers, the union will continue to hammer away for shorter workweeks and longer vacations.

• **S-P's Special Case** — Studebaker-Packard Corp. is still negotiating for a below pattern settlement. Its contract expires Nov. 30. Company bargainers say current UAW demands would boost S-P's cost by $10 million a year. The Larkmaker shows a $10.3 million loss for the first nine months of '61.

Iron Ore Inventories

(Millions of gross tons)

As of:	Lake Superior Ores*	Imported Ores**	Total
Dec. 1, 1961†	55.3	23.3	81.5
Dec. 1, 1960	51.6	25.4	80.7
Dec. 1, 1959	37.9	28.5	69.8
Dec. 1, 1958	53.1	17.5	74.5
Dec. 1, 1957	54.4	14.0	72.0

*Including Canadian Lake Superior ore.

**Including Canadian ores other than Lake Superior.

†Estimated: October and November official figures lacking.

Estimated iron ore inventory Dec. 1, 1961	81.5
Expected ore receipts Dec. 1, 1961, through Apr. 1, 1962	12.0
Total available supply Dec. 1, 1961, through Apr. 1, 1962	93.5
Expected ore consumption Dec. 1, 1961, through Apr. 1, 1962	39.5
Total ore on hand Apr. 1, 1962 (estimated)	54.0
Ore in inventory Apr. 1, 1961	64.7
Ore in inventory Apr. 1, 1960	41.8
Ore in inventory Apr. 1, 1959	44.9
Ore in inventory Apr. 1, 1958	53.0

Venezuelan iron ore train moving through jungle to an Amazon River port

Ore Stocks: No Winter Shortage

THE GREAT LAKES iron ore fleet is winding up a mediocre shipping season, but it is finishing faster than it started.

Going into November, 138 vessels were in service (65.7 per cent of the fleet of 211). Many will continue in commission through the month, weather permitting. In contrast, only 86 boats were active (40.7 per cent) in May. The season's peak was hit in August when 143 ships (67.7 per cent) were operating.

• **No Ore Shortage** — November lake shipments are expected to fall only slightly below October's 8.3 million tons, which would bring the total for the 1961 movement close to 60 million tons vs. 69.6 million in 1960.

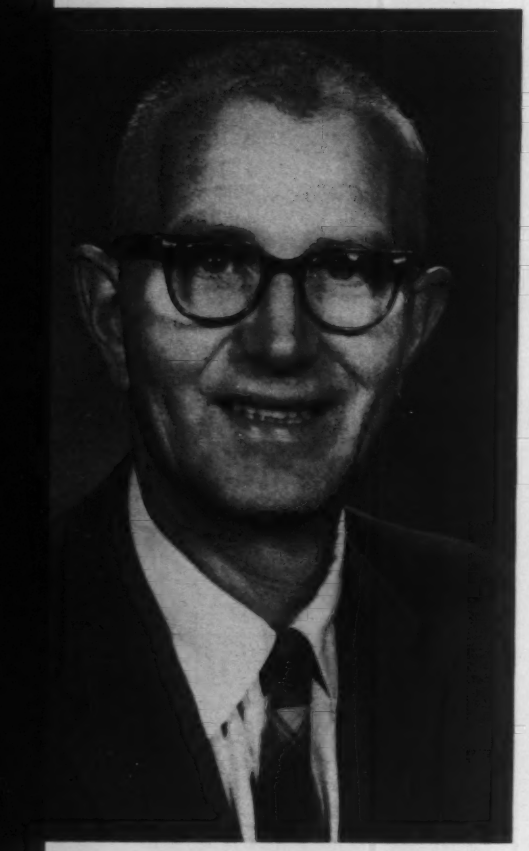
No winter shortage of ore is in prospect. Stocks (from all sources) are expected to be around 81.5 million tons on Dec. 1, equal to eight months' supply at the current rate of consumption (9.6 million tons monthly). But there's an imponderable in the outlook: Hedge buying of steel against a possible midyear strike may spur ingot production and ore consumption in early '62.

• **Getting Prepared** — Since Lake Superior ores account for 55 to 60 per cent of consumption (despite larger imports and other domestic sources), oremen want adequate lower lake stocks to meet any eventuality. A stepup in steel inventorying would likely bring a surge in steelmaking and probably result in the relighting of many of the 99 blast furnaces now idle.

Based on anticipated consumption slightly in excess of the current monthly rate, and present stocks plus expected winter intake, it's estimated that ore stocks at the start of lake navigation next year will exceed 54 million tons, down from the 64.7 million in stock on Apr. 1, 1961, but up noticeably from the 41.8 million held in 1960 (see table).

• **Imports Down**—The intake of foreign iron ores (including Canadian other than from the Lake Superior region) slowed down in 1961. The total in the first nine months was only 17.2 million tons vs. 26.8 million in the same period of 1960.

The principal sources of imports continued to be Venezuela, followed (in order) by Canada, Chile, Peru, Brazil, and Liberia.



Leslie W. Ball, reliability director
Aerospace Div., Boeing Co.

'We Expect Suppliers to

1 "We expect even a small supplier to have records of his experience. Management must be sure that experiences are fed forward to improve the reliability of future production.

"Such a system for retaining experience must include facilities for meticulous dissection and analysis of failed parts. In a small company, (the facilities) could be just a clean bench and a set of tools. But (they) must be kept available for failure analysis only.

2 "Failure analysts must be engineers not assigned to a project staff. Our experience has shown that people who are primarily interested in completing a project aren't effective in incorporating failure lessons.

3 "We want a supplier to have documents which show how reliability is being created and assured. Verbal

How to Improve Reliability Control

THE DOMINANT PURPOSE of a reliability program is to cut the customer's gross cost of using what you make. That's why relationships between a manufacturer and his suppliers are so important, stresses Leslie W. Ball, reliability director, Aerospace Div., Boeing Co., Seattle.

Although the approach is a must for prime contractors working for the Air Force, it is also important in other businesses, Mr. Ball recently told members of the American Society of Lubrication Engineers.

• **Study Costs**—"The amount you put into a reliability program should be determined by studying tradeoffs with other factors like service and costs," states Mr. Ball.

He advises: First, consider the cost of developing, manufacturing and maintaining the equipment with no reliability; then calculate the costs for various degrees of reliability.

In highly competitive areas, it isn't practical for a supplier to move prices or costs ahead of his customer's unless the customer can measure the degree of reliability he is buying.

• **Be Specific**—Until lately, an outline for a reliability program was generally a long winded narrative about philosophy and intentions. Today, says Mr. Ball, you must state: Which techniques you will employ, how much effort you are going to put into the program, and when you will perform each step.

One reason why you must be specific: Testing costs, the leadtime involved, and similar factors play important roles in the failure rate specification. Often, the failure rate is so low that it is impractical to demonstrate in either a qualification test or in receiving inspection. For example: It would be impractical in terms of time and cost to test all the transistors in a Minuteman.

• **Developing a Program**—A reli-

Practice Reliability'

instructions are not enough. A chartroom will visibly display accomplishments and growth.

4 "We like to see formal methods for integrating management authority and reliability technology. Reliability engineers must be backed up with signed directives and top drawer surveillance to check the degree production people are following recommendations.

"On top of the records . . . of failures, a contractor must state how his reliability resources will be applied to new items. If research and development are involved, a formal program may be required. For off-the-shelf items, a simple design review or qualification testing may be enough.

"Finally, some way must be made to permit both the supplier and customer to have a look at reliability accomplishments."

ability program should take full advantage of what you have learned about manufacturing techniques through experience.

The development of reliability technology in a plant follows four scientific steps: Observation, analysis, hypothesis, and application tests.

"First," says Mr. Ball, "we are concerned with 'observing' equipment failure rates, both in the field and in the laboratory.

"Next, we determine how our product fails—but it's not enough to only analyze. We apply another refinement called 'failure discipline analysis'—we trace the cause of failure to its source." That involves: Identifying the employee group responsible, studying controls over such groups, and improving the controls.

The third step: Hypothesize or organize the information into a body of knowledge that can be applied to future management decisions.

"Finally, we apply and test our hypothesis by setting up a formal reliability program in the plant," he concludes.

• **Document It**—Each step of the scientific method should be put into writing. It's the only way to make intelligent use of the information gained.

Mr. Ball suggests that several documents are necessary first steps in "failure discipline analysis."

1. You should have training textbooks covering all operations.

2. You should have documents on policies and orders or process specifications. (Where possible, such guides or drawings should be memorized.)

3. You should have bench instructions — ordinary documents which employees use. (Boeing, for example, controls work with a "manufacturing and inspection record" that specifies each step and requires a worker to sign off his operation.)

In implementing the second step, you must insure that documents carry the information needed and that they convey the ideas you intend, cautions Mr. Ball.

For the third step—improving controls—Boeing either adds more control documents or improves their clarity.

Plant Gets Set for Tank Production

CADILLAC Motor Car Div., General Motors Corp., is reactivating its Cleveland ordnance plant on the strength of several "get ready" contracts worth nearly $30 million.

In addition to tooling preparations, Cadillac will hire about 4800 people. Demand for engineers is heavy, says Harold G. Warner, general manager. Large scale hiring will begin in the first quarter of 1962.

The plant will produce track type vehicles for the U. S. Army: The T-195, self-propelled, 105 mm howitzer; the T-196, self-propelled, 155 mm howitzer; and the T-114 command and reconnaissance vehicle. All three are armored with aluminum plates to reduce weight. The T-114 also uses lightweight materials in the hull suspension and power train components. (It's designed to be amphibious and air droppable.) First shipments are scheduled for spring of 1962, says Cadillac.

The vehicles carrying howitzers are diesel powered. GM's Allison Div. makes the diesel units. The reconnaissance vehicle uses a heavy duty, Chevrolet truck engine.

Engineering and engineering production staffs are planning equipment and material purchases to fulfill the military contract. The plant has about 28 acres under one roof. Some equipment is being removed to make way for new lines and other tools being readied for tank production.

Although inactive since 1957, the plant has carried on research and development projects with the aid of its engineering and engineering production staffs.

W. O. Robertson, president, Armco Drainage & Metal Products Inc. (left) and Carl Koch, residential architect

Steel executive, architect check progress as . . .

Armco Goes After Housing Market

ARMED with new products and techniques, Armco Steel Corp., Middletown, Ohio, is getting set to invade the housing construction industry. To demonstrate some of its recent developments, a 28 unit apartment project is being constructed in Middletown.

Armco decided to tackle the apartment field first, believing it is there that the builder is particularly susceptible to the cost-quality squeeze. And apartment building is a large segment of the $17 billion a year housing construction business.

In late 1959, Armco retained Carl Koch & Associates, Cambridge, Mass., architect, to study the possibilities for "fresh, new approaches to building techniques and materials." It offered only this direction: Design a multiple family, medium income, garden type apartment, "making maximum intelligent use of steel."

"We asked Mr. Koch to find those areas in building construction where steel—particularly light gage steel that is easily shaped by cold rolling—could make the most logical, practical, and economical contribution," says W. B. Quail, vice president-distribution. "This direction was based on our opinion that greater contributions to better housing will not come from all-steel research, but only from studying proper use of steel in combination with other materials."

After two years' study, the architect and steelmaker have come up with "new concepts (that) are independent of each other," says Mr. Koch, "and are designed for easy integration with conventional systems and materials. The products and systems can be used freely by builders and architects in a wide range of residential structures, motels, schools, and similar units."

Here are some of the significant features which will appear in the Middletown apartment project:

- **Roof Ceiling System**—Estimated to cost less than $2 a square foot (compared with an average $2.75 for conventional construction), roofs are constructed with box-type ribbed panels of aluminum coated steel. The panels are supported by steel purlins which are roll formed, light gage,

sheet metal. A finished ceiling of steel panels is suspended from the C-shaped purlins.

• **Floor Slab**—The floor system contains a completely integrated air distribution system. It is an 8 in., reinforced, concrete slab, formed by pouring concrete over half-round, metal pan arches laid on a deck of interlocking steel panels.

• **Window Walls** — The window wall system, conceived by the Koch firm and engineered by Hayes Industries Inc., Jackson, Mich., manufacturer of automobile windows, is basically a roll formed steel section that can "frame in" a variety of wall and window materials. The system requires a minimum of field bolting and no welding. Most connections are made with simple clips, wedges, and snap-on devices. The units function as sashes, mullions, jams, and heads.

• **Sun Screens** — The apartments will be equipped with exterior sun screens both for aesthetic value and to cut air conditioning requirements. They are designed to move in sliding tracks, operated manually or by motor. They are fabricated of porcelain enameled, expanded metal.

• **Wall Panels** — Three, new, steel panel wall designs are being used in the apartments. The 16 in. panels are roll formed with vertical ribs in different textures. They are backed with wood furring, a 2 in. insulating blanket with integral vapor barrier, and ⅜ in. gypsum wallboard.

• **Potential** — "If these new items enable us to attract only 1 per cent of the residential building market, it would mean 100,000 tons of new steel business," estimates Mr. Quail. "If (they) prove as economical as they now appear, they will open a major new market for special steels of Armco Div. as well as a new source of fabricating business for Armco Drainage & Metal Products Inc. (to be known as the Metal Products Div. after Jan. 1)." Capitalizing on industry's heavy investment in roll forming equipment, the products are expected to find wide acceptance among manufacturers.

GE Perfects High Voltage Circuit Breaker Unit

A SEARCH of more than 30 years for a high current automatic circuit breaker that operates in a vacuum has succeeded. General Electric Co.'s High Voltage Switchgear Dept., Philadelphia, revealed last week that it has a working prototype of an automatic high voltage recloser.

It is fast acting, noiseless, and not a fire hazard—thanks to the absence of flammable materials. The recloser's relatively small size and lightness eliminate the need for an extra sturdy foundation since it does not cause any appreciable ground shock. Maintenance is simplified by long service life and easy replacement of the vacuum unit. It is also relatively immune to lightning strikes.

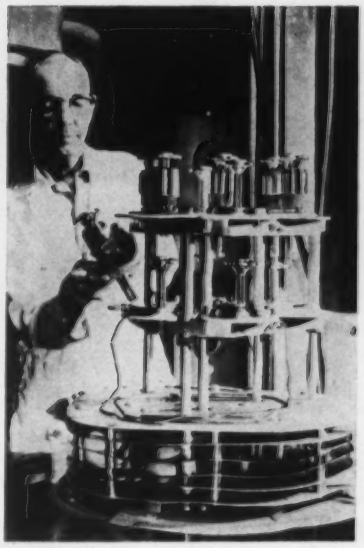
The recloser, which has a rated interrupting capacity of 8000 amp at 15.5 kv and 12,000 amp at 4.8 kv, will be especially useful in preventing burndowns caused by power fault in high voltage lines and in substations, including in-plant power sites. It can also be adapted to various switching functions. Similar vacuum circuit breakers for smaller voltages are planned.

Dr. Guy Suits, vice president and director of research, says that a number of different technologies are involved. He notes these advances:

• Glass-to-metal seals capable of withstanding the stress of high short circuit currents. The secret: GE's Fernico alloy—its thermal expansion matches that of glass.

• Producing and maintaining a near perfect vacuum. It was also necessary to perfect methods of measuring such vacuums.

• Making possible output of degassed electrodes, or contacts, without generating excessive surge voltages, called "chopping." Tungsten and molybdenum can be completely degassed, but they suffer from "chopping." The problem was solved by "zone refining, a purification process borrowed from semiconductor technology.



Operator racks contacts for the vacuum circuit breaker in place prior to brazing and degassing. Brazing bonds the special composition contacts to the contact rod, and this degassing step further purifies the complete assembly

• The elimination of the welding of the contacts, a hazard of pure metals in vacuums. The problem was solved with certain contact materials—their identity has not been revealed by the company. The non-welding property is achieved despite arcing heat that exceeds 18,000° F.

The GE recloser reacts to current jumps in less than two cycles—1/30 second. If there are less than four temporary power surges, the fault sensing unit employing solid state components will trip and close three times, but stay open after the fourth interruption. Flexibility is offered by a wide selection of operating and timing sequences which are adjustable in the field by choice of various combinations of plug-in units.

Production is scheduled to start next year at the Philadelphia plant in a controlled environment that is cleaner than a hospital, GE says.

Aluminum Leaders Offer Trade Pact

Foreign trade group suggests . . .

1. **Set up a flexible system of allocating the domestic market to importers in terms of rising U. S. consumption.**
2. **Establish an agreement between U. S. and other Free World aluminum producers to co-operate on a world-wide new product and market development program.**
3. **Review the government's military buying policy on aluminum products to give domestic industry a better bidding position.**

Irving Lipkowitz, chairman
Foreign Trade Committee,
Aluminum Association

FACING UP to increased foreign competition in both domestic and world markets, the aluminum industry is proposing a new approach to trade policy.

The plan stems from the industry's concern over rising imports of such products as sheets, foil, rods, and bars. Irving Lipkowitz, Reynolds Metals Co. economist and chairman of the Foreign Trade Committee of the Aluminum Association, sees a need for some "world traffic lights."

Mr. Lipkowitz suggests agreements between the U. S. and foreign governments to control imports of aluminum products into the U. S. The plan: Imports would not be cut back or frozen; and they would be allowed to grow as the U. S. market grows. Quotas would be on a product by product basis. In exchange, the aluminum industry would like to get a green light into the Common Market—it now has a discriminating tariff against aluminum ingots.

● **THE THINKING**—The aluminum industry says it is seeking to avoid protectionism via the Reciprocal Trade Agreements Act or tariffs.

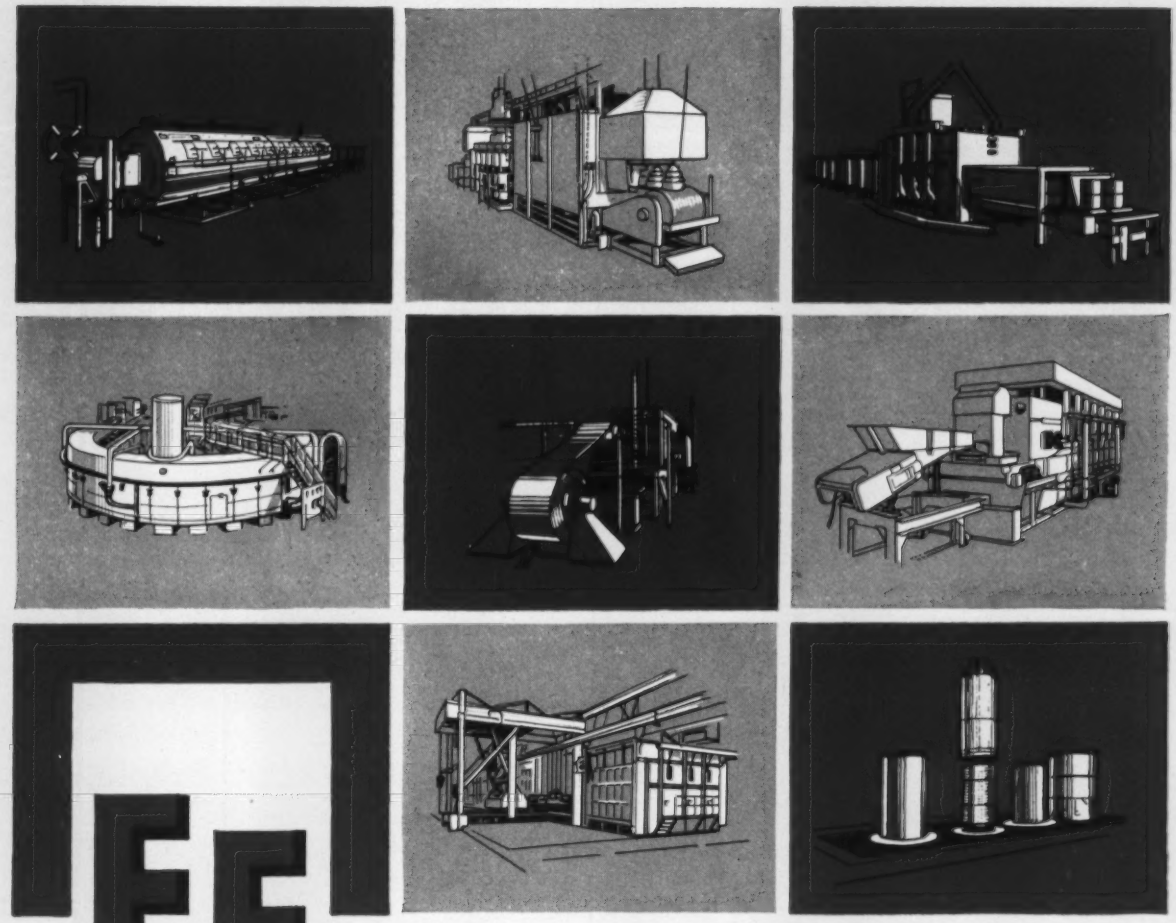
In return for giving foreign producers access to U. S. markets, the industry wants restrictions lifted on the export of U. S. aluminum ingots into such countries as Australia, Germany, Italy, Japan, and Switzerland. High tariffs are now in force. Semifabricated exports from the U. S. face even greater discrimination.

One observer in Washington comments that the proposal is reasonable and will be considered in foreign capitals if our government endorses it. If the Europeans refuse to negotiate, the reaction in Congress could be toward protectionism.

Although the program is directed toward the immediate problem of imports, the long range philosophy is equally important. It should appeal to the Kennedy administration. The plan is designed to make the scramble for markets less hectic than it is today. It would enable the U. S. aluminum industry to devote time, thought, and money to the vast potential aluminum markets in underdeveloped countries.

Mr. Lipkowitz points to the need for housing, irrigation equipment, and electricity in the emerging nations. The average U. S. citizen consumes 23 lb of aluminum a year. Comparisons: The figure is 8.5 lb in Europe and $\frac{1}{3}$ lb in the rest of the Free World.

● **BUY AMERICAN**—One point the industry will probably not make much headway on: Its request (point 3 above) to modify the Buy American Act. When foreign suppliers bid against domestic firms for military aluminum contracts, they win 94 per cent of the time. The low foreign bids run an average of 28 per cent under the low domestic bid. But the administration probably won't change government procurement policies to favor domestic suppliers; the action would contradict its effort to get Congress to develop a more liberal trade program next year.



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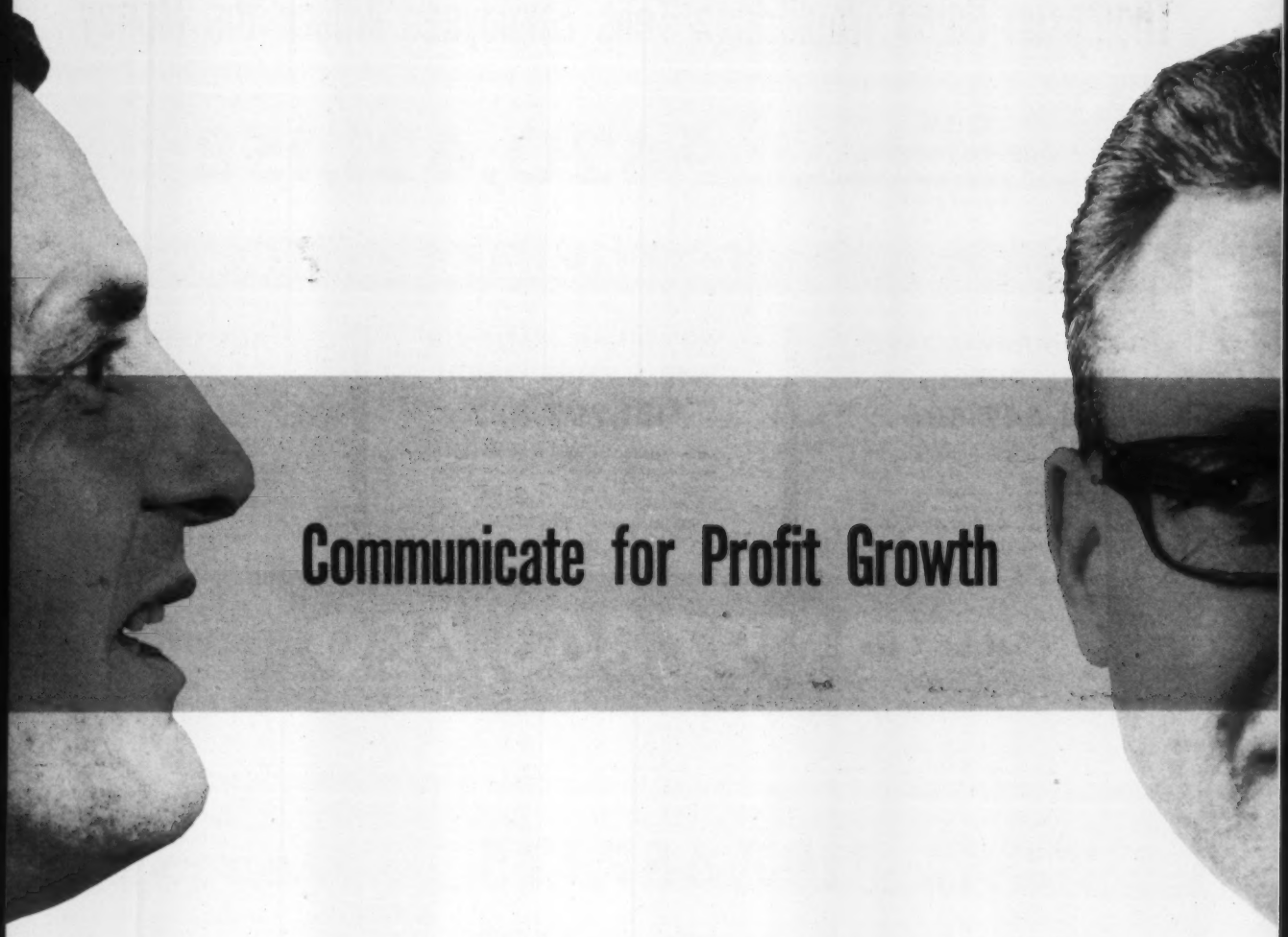


Communicate for Profit Growth

"HOW MANY men in your plants understand the relationship of profits to jobs and job security?" asks Charles M. White, former Republic Steel chairman.

"How many understand the relationship of dividends to your ability to raise equity capital? Of productivity to wage increases? To prices? To the standard of living? In this area, we have failed to communicate the facts to our employees, and many of our costly labor troubles stem from this failure."

Business spends an estimated $500 million a year on employee communications, "but much of it is deathly dull because it avoids the controversial issues that are interesting," charges one critic.

Communicate What?

To be energetic and effective, you need to communicate about the right subjects. Singer Mfg. Co. picks those that "will improve employee relations by fostering a better understanding and acceptance of the company's actions, policies, plans, problems, and economic beliefs."

Here are some of the types of information Singer communicates:

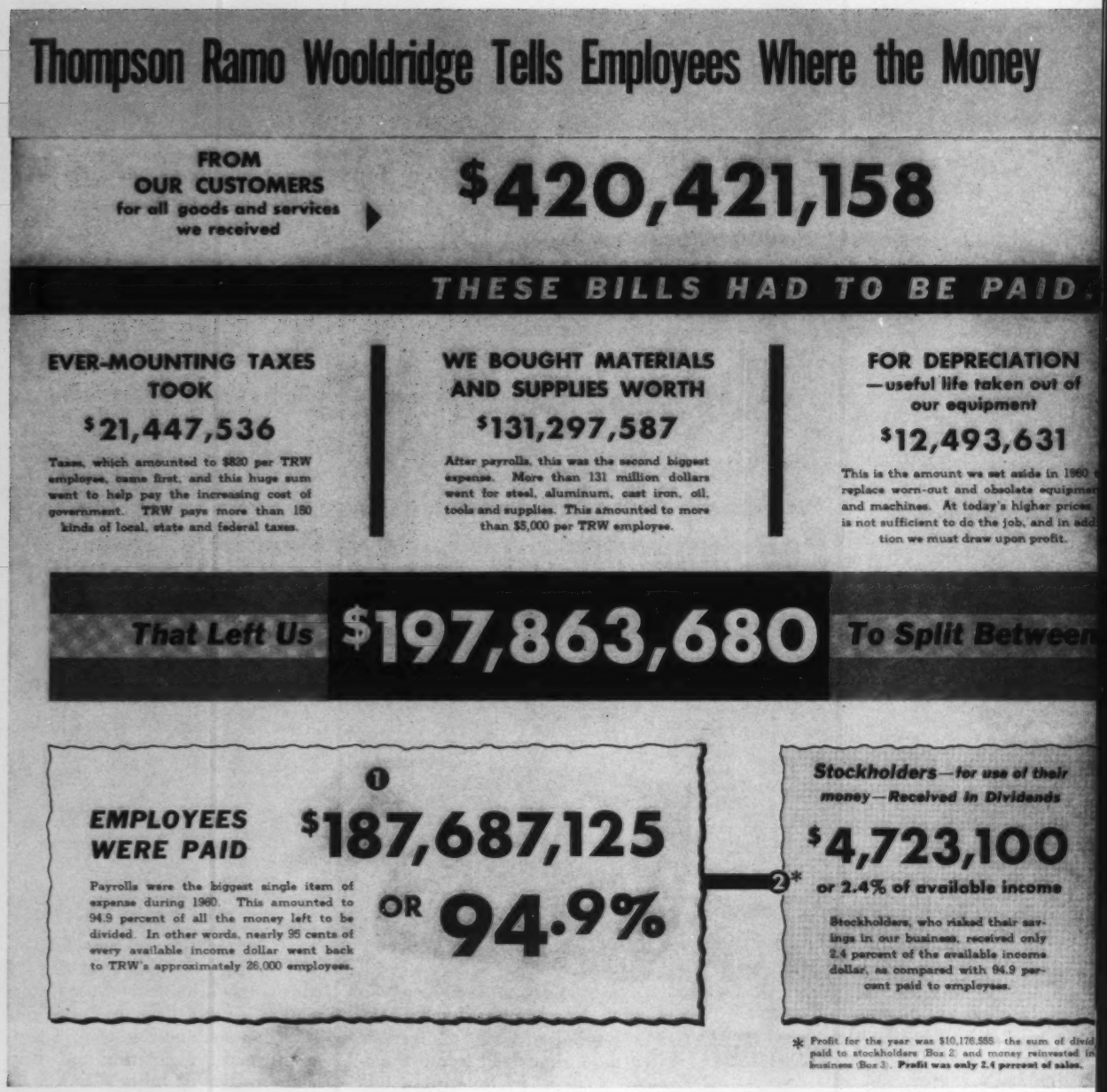
1. **Financial:** The company publishes a special annual report for employees each April, emphasizing profits per dollar of sales and the relationship between total payments to employees in the form of wages, salaries, and fringe benefits, plus payments to owners in the form of dividends. Quarterly reports of sales and earnings are also published.

2. **Competition:** The sewing machine manufacturer keeps its employees fully informed about the competitive situation. Such information is particularly useful in cost reduction and quality control programs and in pointing out why labor costs must be held down.

3. **The Economy:** Singer publishes a great deal of economic information about taxes, depreciation, profits, and other subjects. Wherever possible, it relates the information directly to its business. It doesn't use canned material.

4. **Community Service:** The company encourages its people to participate in local affairs by giving publicity to those who do and by preparing editorial matter pointing out the importance of doing so.

5. **Education:** Singer publicizes its assistance to education through tuition aid for employees, merit scholarships for employees' children,


Thompson Ramo Wooldridge Tells Employees Where the Money
FROM OUR CUSTOMERS for all goods and services we received
$420,421,158
THESE BILLS HAD TO BE PAID:
EVER-MOUNTING TAXES TOOK
$21,447,536
Taxes, which amounted to $820 per TRW employee, came first, and this huge sum went to help pay the increasing cost of government. TRW pays more than 150 kinds of local, state and federal taxes.
WE BOUGHT MATERIALS AND SUPPLIES WORTH
$131,297,587
After payrolls, this was the second biggest expense. More than 131 million dollars went for steel, aluminum, cast iron, oil, tools and supplies. This amounted to more than $5,000 per TRW employee.
FOR DEPRECIATION —useful life taken out of our equipment
$12,493,631
This is the amount we set aside in 1960 to replace worn-out and obsolete equipment and machines. At today's higher prices it is not sufficient to do the job, and in addition we must draw upon profit.
That Left Us $197,863,680 To Split Between
1
EMPLOYEES WERE PAID
$187,687,125
OR 94.9%
Payrolls were the biggest single item of expense during 1960. This amounted to 94.9 percent of all the money left to be divided. In other words, nearly 95 cents of every available income dollar went back to TRW's approximately 26,000 employees.
2*
Stockholders—for use of their money—Received in Dividends
$4,723,100
or 2.4% of available income
Stockholders, who risked their savings in our business, received only 2.4 percent of the available income dollar, as compared with 94.9 percent paid to employees.
* Profit for the year was $10,176,555: the sum of dividends paid to stockholders (Box 2) and money reinvested in business (Box 3). Profit was only 2.4 percent of sales.

and gift matching. It regularly emphasizes the importance of education through editorials and special features in its employee papers.

6. **Labor Matters:** The manufacturer publishes summaries of all arbitration awards, including those it loses. In all labor negotiations, it thoroughly explains its position through printed interviews with the works manager.

7. **New Products:** Singer publicizes all new products and technological developments.

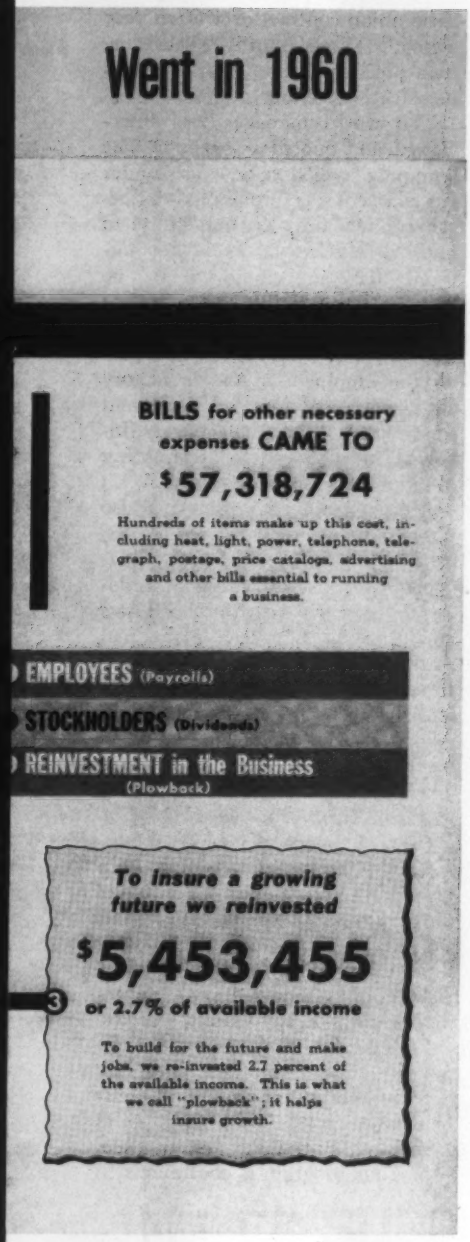
8. **Fringe Benefits:** It continually reminds employees of the many fringe benefits they enjoy, both as a form of extra compensation and as an important factor in over-all labor costs.

9. **Retirement:** Singer occasionally runs articles reminding older employees that retirement should be planned far in advance of the date of separation.

10. **Miscellaneous:** The company also informs its employees about such things as retirements, promotions, and transfers. It reminds them about the credit union and the blood bank. It reports on new acquisitions and the cost of living. It also devotes some space in its publications to cartoons, sports, human interest stories, and personal mention items.

How?

The subjects you communicate are the most important aspect of your program, but how you do the


Went in 1960
BILLS for other necessary expenses CAME TO
$57,318,724
Hundreds of items make up this cost, including heat, light, power, telephone, telegraph, postage, price catalogs, advertising and other bills essential to running a business.
EMPLOYEES (Payrolls)
STOCKHOLDERS (Dividends)
REINVESTMENT in the Business (Plowback)
To insure a growing future we reinvested
$5,453,455
3 or 2.7% of available income
To build for the future and make jobs, we re-invested 2.7 percent of the available income. This is what we call "plowback"; it helps insure growth.

job is vital too.

"Singer uses the recognized communications media — bulletin boards, employee meetings, public address systems, and letters to employees' homes," reports B. F. Thompson, director of public relations. "But we regard employee publications as our first line of regular communication."

It has a company-wide quarterly magazine which carries much general information of an institutional nature. However, the prime job is done by 28 plant publications here and abroad—most of them tabloid newspapers. With this "local" set-up, Singer can tailor its message for each plant.

Many companies seem to regard the house organ as their first line of communications. About $140 million of the $500 million communications budget goes toward publishing some 8000 periodicals, which have a combined circulation of 19 million.

Other firms steer away from house organs because of bad experiences with them—when they were primarily a repository for blurred pictures of fish and babies.

Charles M. Hackett, executive assistant, public relations department of E. I. du Pont de Nemours & Co., admits: "No publication at all is better than a poor one.

"Too many times, companies establishing a publication have underestimated the necessities. The orthodox approach is to install an editor (whose qualifications may or may not be sound) and establish a chain of communications among the various installations. The grand design is that material will flow in from the outposts and be assembled by the central authority into a hodgepodge of type, labeled as 'by and for the employees of . . .'

"Publications which operate on this carefree procedure seldom reflect much credit upon their sponsors and seldom accomplish much for anybody.

"No publication, industrial or commercial, which is worth its keep can leave anything to chance. The flow of material from plant sources is unreliable and unpredictable.

"Purposeful industrial publications are not 'by and for the employees of . . .' in the old fashioned sense of the everybody-help-out gossip sheet. Top flight industrial publications are operated by professionals. While they are for the employee body, they are at all times the organs and instruments of the companies which sponsor them."

The "how" of communications also involves credibility. How do you get your audience to believe you? All experienced communicators advise: Be honest. If you make an error, admit it promptly and set the record straight. But also be courageous. If you make statements you believe to be honest and carefully considered, stick to your guns if they are challenged.

Dr. Claude Robinson, president of Opinion Research Corp., adds these five points for those seeking to communicate in meaningful terms:

1. In your public statements and in your policy considerations, go out for the good life, declare your devotion to the public's goals, make it clear to the public that the thing you seek is the public good.

2. Never discuss means until you have defined the ends.

3. Never criticize the other fellow's means until you have declared your position with respect to his ends.

4. Talk more about what you're for, rather than what you are against.

5. In criticizing the other fellow's program, define the end first, then point out that his path will not lead to the desired goal, but that yours will.

Robert E. Vivian, a specialist in communications, believes that the chief executive officer in a company has a great deal to do with the acceptance of communications. Your story stands a good chance if he has three qualities:

1. A deep and sincere determination that the entire management force be wholly committed to the year-in, year-out job of securing and maintaining sound and honest relationships with employees and with each other.

2. An uncompromising willingness to set forth company policies fully and frankly; to stand for the right when it is uncomfortable as well as when it is convenient.

3. Unswerving advocacy of communication as a way of life in the company, with a willingness to budget both personal time and corporate funds for the job of fostering human relationships capable of binding the corporate family together.

Communications Pay Off

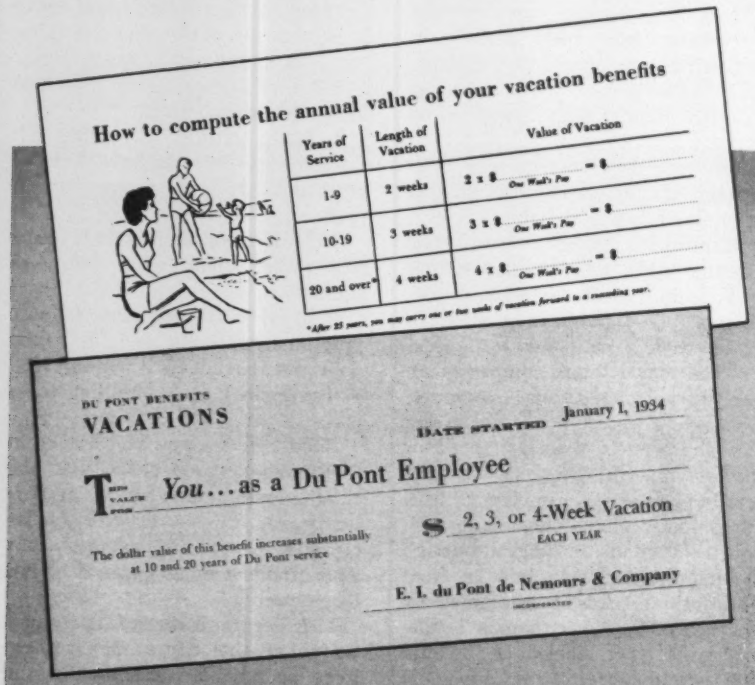
Do the time, effort, and money spent on communications pay off? They do for Singer. For example, in November, 1959, employees at its Elizabeth, N. J., plant voted overwhelmingly to accept a one year contract that was initiated by the company, not the union. One union member of the bargaining

committee put it this way: "The company bargained the contract, not the union."

The principal ingredient added to Singer's communications program that year: The plant's newspaper published contract changes which the company would insist upon and the areas in which the firm was prepared to make wage adjustments. A house organ article straightforwardly stated the aim was "to correct the unsound local work practices which have crept into the basic union contract over a ten year period." Singer bluntly labeled one such practice as the "average earnings featherbedding gimmick."

The works manager was interviewed and quoted as saying: "The 'bumping' which takes place under our old seniority provisions has become a real drag on our efforts to improve efficiency. It is not unusual for an employee to be 'bumped' from a job before he has had time to find out where the washroom is. What good does this do the employee? As for factory costs, we just plain cannot stand the waste of time and money involved in such continual shuffling of employees from job to job."

Although blunt, Singer also phrased its terms in the employees' own interests. It noted that it was one of the last survivors in the domestic sewing machine business and that its Elizabeth plant had shrunk to less than half its former size under the impact of low-wage foreign competition. The works manager wound up his interview by saying: "Now the chips are down, and I don't want this factory to shrink further or close."


How to compute the annual value of your vacation benefits
Years of Service
Length of Vacation
Value of Vacation
1-9
2 weeks
10-19
3 weeks
20 and over*
4 weeks
DU PONT BENEFITS
VACATIONS
DATE STARTED January 1, 1934
You... as a Du Pont Employee
2, 3, or 4-Week Vacation
EACH YEAR
The dollar value of this benefit increases substantially at 10 and 20 years of Du Pont service
E. I. du Pont de Nemours & Company

Communicate About Employee Benefits

You can reap large benefits by informing your people about their job fringes. Some metalworking companies pay as much as $1 per man per hour in benefits. On the average, they're running 25 per cent of the U. S. payroll dollar.

Workers know fringes exist, but they aren't overly impressed. They don't see them in their paychecks.

Du Pont has tried to do something about that by sending employees a booklet of mock checks. Each "check" shows one benefit. A handy form with each check helps the employee figure out how much the benefit is worth to him.

Besides the vacation benefit check (shown above), Du Pont's booklet has checks for holidays, thrift savings, disability income, hospital-surgical coverage, pensions, life insurance, and miscellaneous benefits.

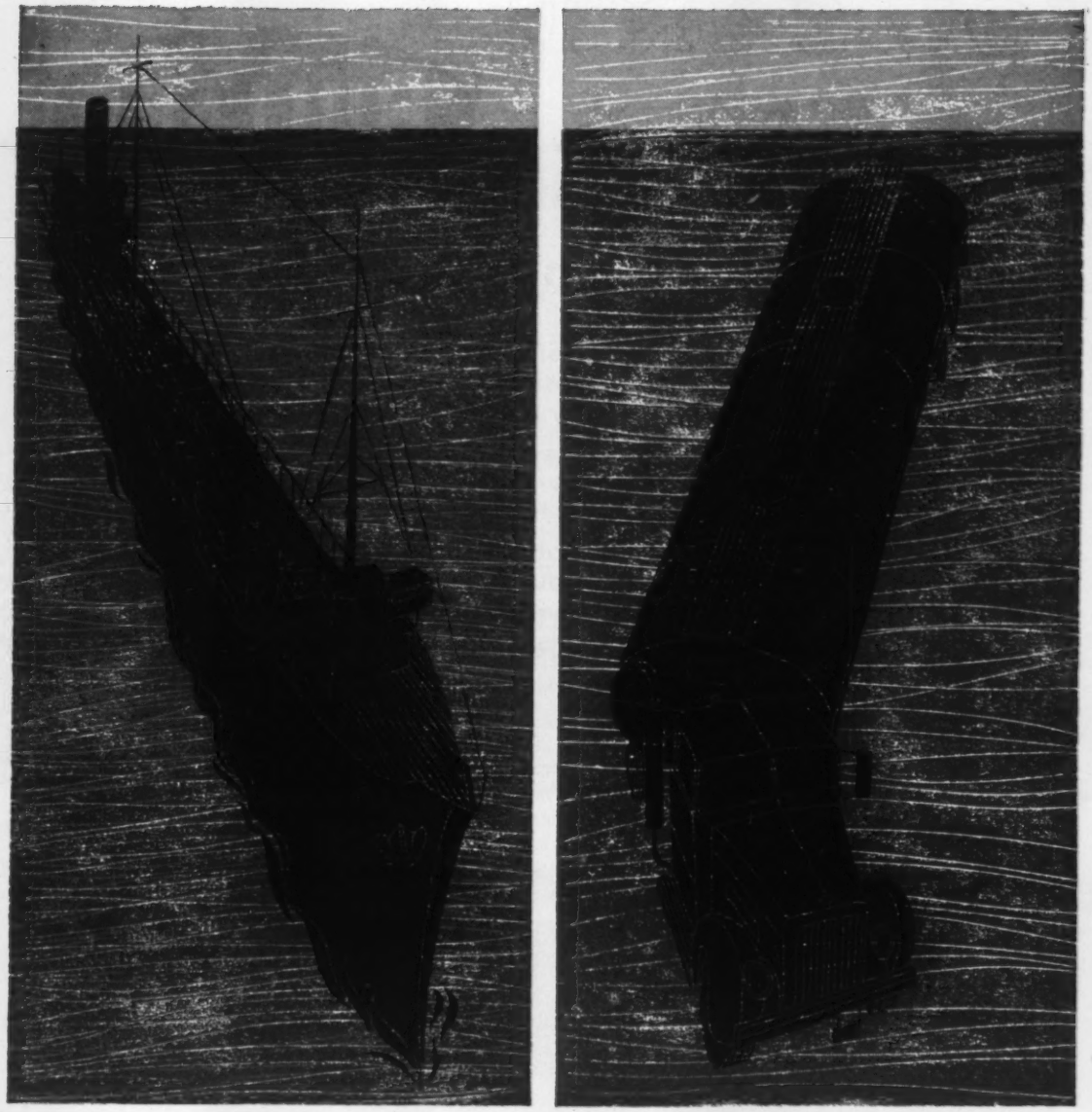
Good communications can help keep costs down and thus make profits grow. And, as Mr. Vivian suggests, you get good communications when:

1. Top management participates in mapping objectives and policies.
2. Talented people carry out the policies and achieve the objectives.
3. Programs are tailored to circumstances.
4. Your statements are credible.
5. Your program is continuous.

PLAN FOR PROFIT GROWTH

Labor for Profit Growth

On Dec. 4, STEEL will explore the possibilities for better labor-management co-operation. For a free copy of any or all articles in this series (appearing biweekly since Jan. 16), write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.



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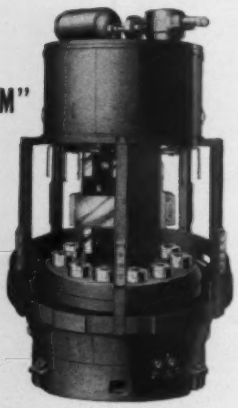

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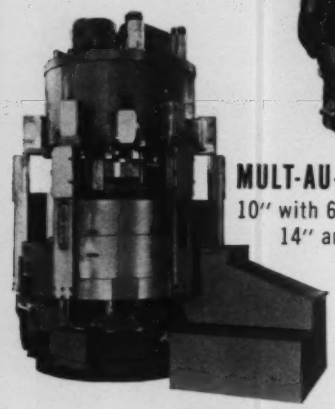
Available with 6, 8, or 12 spindles.



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10" with 6, 8, 12, or 16 spindles, 14" and 18" with 6 or 8 spindles.

Before you buy, investigate the many outstanding features and advantages offered by modern Bullard Machine Tools.

Day-in and day-out—they are proving their ability to produce more in less time—thereby reducing the cost per piece.

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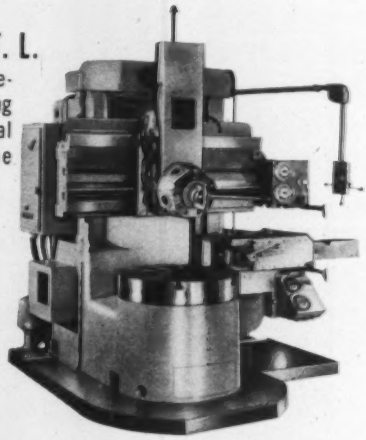

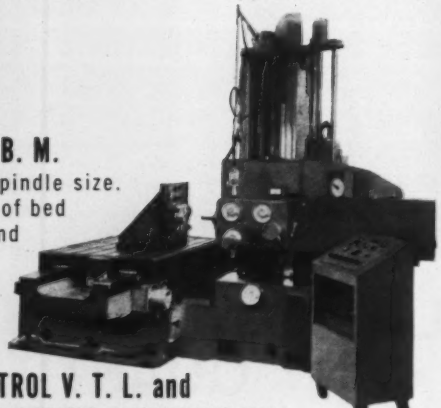

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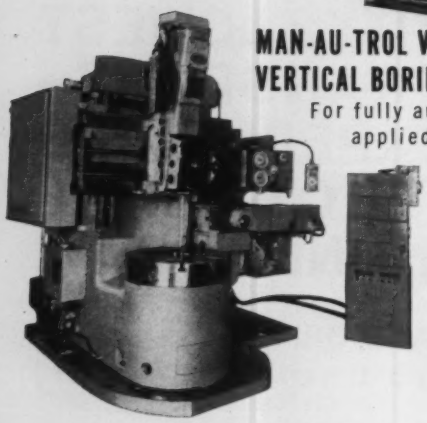

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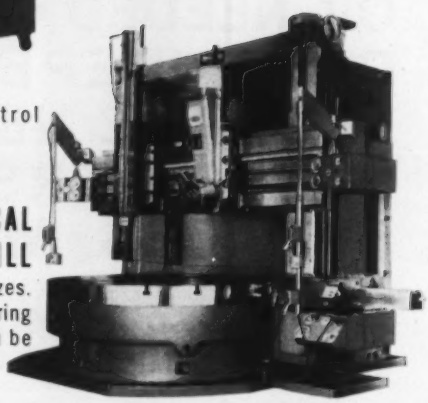
DYNATROL VERTICAL BORING & TURNING MILL
108", 124", and 144" table sizes. Discrete positioning or contouring numerical control system can be applied.



Tooling Orders Hint at '63 Changes

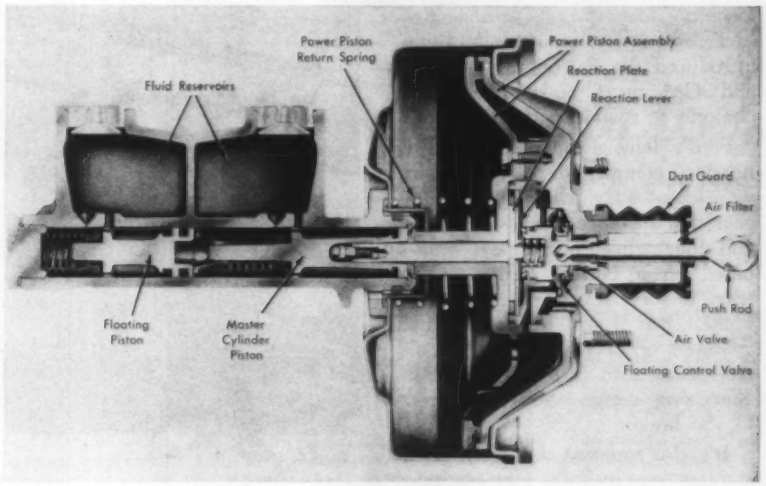
TOOLING releases for 1963 model cars have finally broken. Tool and die shops say that while the volume isn't as large as anticipated, it's still considerably larger than last year's. Even better—the shops say it looks now like 1964 programs will be equally as large.

Although major body panel tooling was released several months ago, tools and fixtures for assembly lines are just coming out now. Detroit gains the impression that Ford's 1963 tooling program will call for three times the hours required for 1962 cars. GM's programs appear to be double 1962 size. Chrysler Corp. and American Motors Corp. are making about the same number of changes they made last year. Studebaker-Packard Corp. is calling for more tooling than it had for 1962.

So far it looks like more of the tooling will be done in noncaptive shops. Virtually none is being placed overseas. Automakers appear to have learned a bitter lesson—that quality and on time delivery outweigh any price concessions they may gain from buying tooling in Europe. Venders are griping, however, because they claim automakers released tooling orders late, but want delivery at the same old time. That means April for major body panels, May and June for most other tooling. Result: Tool shops will be forced to go into costly overtime work. Some of it won't be recovered from their bid prices.

• **Skin Changes Ahead** — "I'd say 1963 programs could be considered major sheet metal changes," says one tool shop owner who has had a look at many of the quotes on parts. Some revisions are already apparent. GM, for example, has canceled earlier plans for unitized bodies. It will continue with body

Dual Braking Adds Safety



THE DUAL braking system, which is new this year, features separate pistons and brake fluid reservoirs for each set of front and rear wheels. If a hydraulic line ruptures on either half of the system, the other side will continue to operate.

That assures you of adequate braking on at least two wheels.

If both parts of the system go out, you still can stop the car with the emergency brake, which is designed so it won't lock while the car is in gear. (It can be pumped like a regular brake.

The emergency system has its own vacuum booster reservoir.

GM's Delco Moraine Div., and Bendix Products Div. of Bendix Corp., developed the dual system. Both divisions supply Cadillac. Bendix also sells the system to American Motors Corp. It's standard on all 1962 Ramblers.

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U. S. Auto Output

Passenger Only

	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,241
April	446,739	582,869
May	542,303	611,260
June	599,474	613,136
July	399,191	434,377
August	195,266	305,514
September	354,711	407,691
October	557,200	617,972
10 Mo. Totals	4,283,085	5,575,048
November		597,638
December		523,422
Total		6,696,108

Week Ended	1961	1960
Oct. 14	96,207	144,056
Oct. 21	143,150	146,339
Oct. 28	159,136	150,019
Nov. 4	152,855	145,537
Nov. 11	151,758†	138,682
Nov. 18	152,000*	149,753

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

and frame construction for its standard sized and luxury cars—at least until 1964. No major engine or transmission programs for next year's GM cars are reported. But its Australian subsidiary, which builds the Holden car, has ordered special machine tools for a new engine line. Apparent reason: Ford has introduced the Falcon to Australia, and GM must make powerplant changes to remain competitive.

Ford's long awaited Cardinal is nearing completion. The 95 in. wheelbase body will get running gear that includes front wheel drive and four wheel mechanical brakes based on a Girling design. Contrary to some reports, it isn't a disc brake. But it will incorporate two cylinders on each wheel. It's a direct acting unit instead of the self-energizing design used on current U. S. brakes.

It's also rumored that Ford is designing an in-line, four cylinder engine for the Falcon, so it will be more competitive with Chevy II's straight four. Apparently, the confusion involves the narrow angle V-4 that will power the Cardinal. Another point: Ford may introduce the Cardinal under the Falcon nameplate, just as it brought out this year's Canadian X as a Fairlane model. But it is true that Ford of England has an in-line four that could be brought over to this country for use in Falcons.

• **Forward Look** — Chrysler Corp. does not have much money to spend on changes, but if it follows 1961-62 practice, it should convert its Chrysler-New Yorker body from semiunitized to fully integrated design. That would call for considerable assembly line changes. Aside from that, Chrysler looks to be going for sheet metal styling changes.

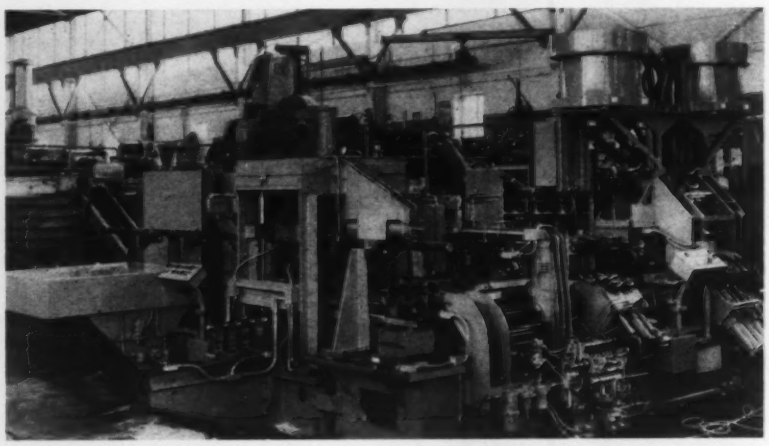
• **AMC and S-P**—American Motors Corp. is figuring on keeping its present body shells and drive line components next year. Sheet metal will undergo minor changes. Grilles on the Classic models are expected to switch from aluminum to diecast zinc. Next big change for Rambler will be for 1964.

In South Bend, Ind., Studebaker-Packard Corp. appears to be in the throes of making some sheet metal styling changes for 1963 Larks. Basic body shells won't be altered, and appearance of the cars will still follow this year's styling, but the changes are enough to call for new quarter panel, roof, and hood dies. Another switch reportedly will be an aluminum instead of gray iron transmission housing.

Zinc Making Comeback

ZINC has been making a quiet comeback since dual nickel techniques have been announced. The American Zinc Institute claims that 1962 cars are using 10 per cent more zinc than their 1961 predecessors. That's an average of 80 lb per car. One of the major comeback areas: Grilles. In 1959, zinc had been replaced in grilles by aluminum in all but six models. Now it's used in half of the industry's 1962 grilles. Due next: Grille on the 1963 Thunderbird.

One indication of the nonferrous metal's revival comes from GM's Ternstedt Div. plant in Flint, Mich. It is casting 750,000 lb of zinc daily. Division sources tell STEEL that the figure is expected to reach 1 million lb daily next year. Ternstedt makes automotive hardware and ornamentation for GM cars.



New Line Boasts Quick Change Feature

THIS TANDEM PRESS LINE assembles cam bushings and welsh plugs in Buick's V-6 engine block. The presses can be changed over in less than a single shift to do the same job (without retooling) on V-8 blocks. Developed by Detroit Broach & Machine Co., Rochester, Mich., the tandem system consists of two interlocked presses. Each has six stations. The scheduled production rate is 180 blocks an hour. A unique technique: The sealer for the welsh plugs is automatically spun into the water jacket holes before the plugs are pressed into place.

Ernst cuts steel costs to customers up to 10% with three new Wean Coil Processing Lines

During a recent call on Ernst Iron Works, Division of Ernst Steel Corporation, Jim Moon, sales engineer of McKay Machine (above left), talked with Carl Grosse, plant superintendent, about the three Wean coil processing lines recently installed by this major metals warehousing firm.

According to Mr. Grosse, the Wean slitting, shearing and coil banding lines have reduced Ernst's handling, labor and scrap costs up to 10%. In addition to providing lower costs to Ernst's customers, this modern coil processing system helps this firm give fast service while easing inventory and supply problems through the purchase of standard size coils.

Equipped with modern, automatic controls, the Wean coil processing lines are operated by only four men and can handle 20,000 lb. coils, up to 54" wide and from .015" to .135" thick.

The McKay Machine Company, Youngstown 1, Ohio

The McKay Machine Company is licensed to manufacture, sell and service metal processing machinery formerly manufactured by Wean Equipment Corporation, Cleveland, Ohio.

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You can get Timken® heavy wall seamless steel tubing up to 11" O.D. and 3¼" wall. It's available in all the popular low and intermediate alloy steels and most austenitic grades—304, 316, 321, 347 and other special analyses.

We've been making Timken seamless steel tubing for over 40 years, helping industry solve tough tubing problems. Let our expert metallurgists help you on your steel problems. Call or write the Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.

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'62 Looks Good Despite Pitfalls

THE OUTLOOK for 1962 is good, but the business community can't afford to be complacent. Economic stumbling blocks will probably be more numerous in 1962 than they have been in any other postwar recovery period.

That estimate came from two economic conferences held within the last 11 days—the first was at the University of Michigan; the second was the National Industrial Conference Board's meeting at Detroit.

• **Optimism First**—Generally, prognosticators at both meetings stressed: The economy is still buoyant, regardless of the apparent slowdown late in the third quarter. The expansion will probably reappear in the fourth quarter and continue through most of 1962.

At the University of Michigan's meeting, Prof. Daniel Suits, of the university's Department of Economics, predicted that the automotive and automotive part industries would have record dollar sales in 1962. The industry might sell more than 7 million cars, he declared, and sales of autos and parts combined might rise to $21.5 billion. That would be 5 per cent above the record set in 1955, even with adjustment for a change in prices between the two years.

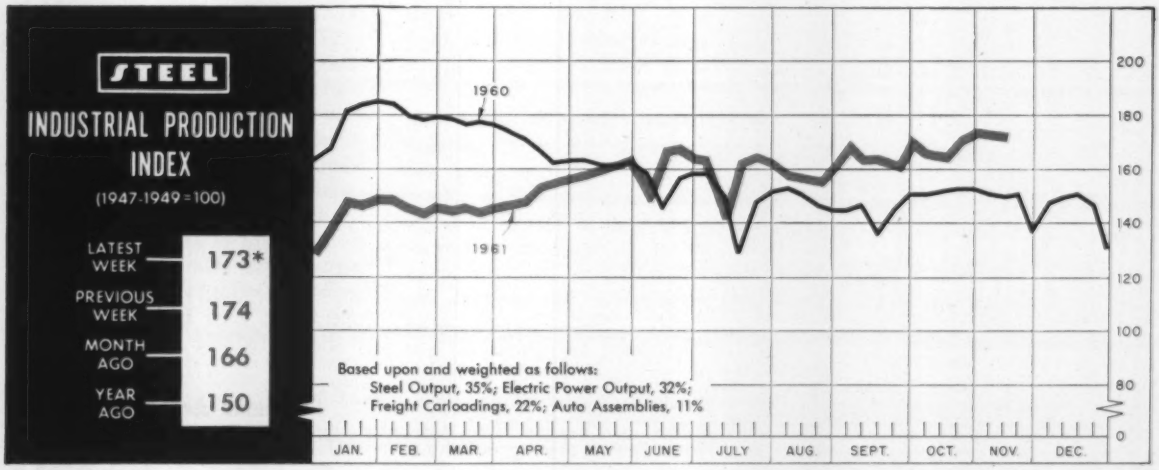
Professor Suits does not expect too much from the nongovernment segment of the economy. He thinks plant and equipment spending will rise only 3.5 per cent (he terms this "disappointing") and the rate of residential construction will be unchanged. "Without an increase in these areas, there will be no substantial growth in the economy. The real expansion next year is coming from consumer and government expenditures."

Based on government spending of $120 billion (federal, state, and local), he looks for gross national product (GNP) to rise to $558.5 billion next year. The civilian labor force will expand to 72.5 million, with 69.6 million employed and 2.9 million unemployed.

• **Below the Trend**—Prof. Warren Smith, University of Michigan economist, said: If the majority opinion of the nation's economists is right, GNP will hit about $540 billion (annual rate) in the current quarter, rise to $560 billion to $565 billion in next year's second quarter, then climb to $575 billion-$580 billion by the end of the year. Average for the year: About $560 billion.

That rate of increase will fall short of what the economy should be doing if you consider a 4 per cent unemployment rate as the standard for full employment. Making certain assumptions regarding productivity and gross private fixed investment, Professor Smith calculates that GNP (4 per cent unemployment) in 1961 should be about $561 billion at 1960 prices. Actually, the economy will fall about $40 billion short of that goal. Carrying the calculations on for 1962, he asserts that the economy should be operating at a $580 billion clip (in 1960 dollars), or $20 billion above the general forecast.

• **P&E Spending Rising**—Margaret K. Matulis, economist for McGraw-Hill's Department of Economics, told the convention: The latest survey of plant and equipment spending for 1962 shows a rise of 4 per cent. In addition, plans already in the books for 1963 indicate that it will be a somewhat better year than the current one. The breakdown for 1962 shows that of ten major industry groups, all but three plan to increase capital spending next year. Electrical machinery manufacturers and chemical producers will cut back from record



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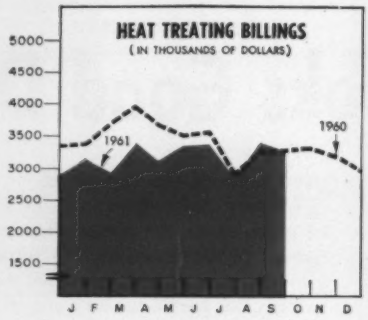
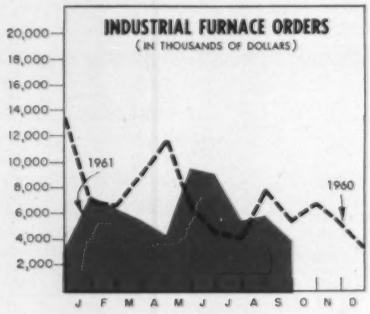




	1961	1960	1959
Jan.	3,171.6	3,381.6	2,769.1
Feb.	2,942.3	3,698.8	2,828.0
Mar.	3,393.3	3,921.9	3,273.8
Apr.	3,140.9	3,642.6	3,316.1
May	3,370.4	3,594.3	3,302.8
June	3,386.8	3,546.7	3,512.2
July	2,880.8	2,906.5	3,302.1
Aug.	3,389.4	3,280.7	3,162.8
Sept.	3,325.9	3,323.5	3,263.8
Oct.		3,306.8	3,531.2
Nov.		3,165.5	3,092.2
Dec.		2,925.2	3,357.2

Metal Treating Institute.
Charts copyright, 1961, STEEL.

	1961	1960	1959
Jan.	7,291	6,827	4,545
Feb.	6,468	6,499	3,596
Mar.	5,535	9,033	7,842
Apr.	4,113	11,687	14,517
May	9,653	6,352	5,315
June	9,194	4,245	8,230
July	5,390	3,966	13,141
Aug.	5,759	7,840	9,738
Sept.	3,915	5,253	5,560
Oct.		6,634	12,867
Nov.		5,084	8,442
Dec.		3,248	13,437

Industrial Heating Equipment Assn. Inc.

high levels, and mining companies see no change. Steelmakers, despite excess capacity problems, will spend 15 per cent more in 1962 than they did in 1961.

• **Consumers Set Pace** — At the NICB meeting, Ross D. Siragusa, chairman and president of Admiral Corp., declared: The outlook is for heavier consumer spending for durables—about an 8 per cent increase for the television-appliance sales alone. Specifics: TV set sales will reach 6 million this year and go on to 6.5 million next year. Refrigerator units sales will climb from 1961's anticipated 3.5 million to 4 million in '62.

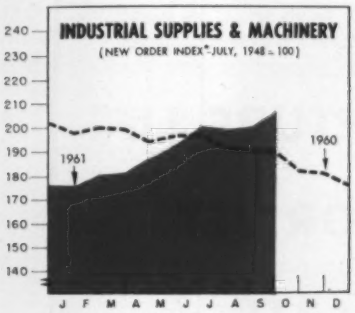
• **Machinery Up**—Conditions generally are favorable for an increase in machinery sales, but there will be no boom, contended H. Glenn Bixby, president of Ex-Cell-O Corp. The industry's trend line will probably follow that of the total economy—continuing but gradual improvement. While foreign sales have accounted for about 30 per cent of machinery volume in recent months, he warned that the favorable situation won't last much longer. He suggested seeking new markets, such as Latin America, Australia, India, and Africa to supplement the European Common Market and Japan.

• **Steel, Construction** — John F. Smith Jr., president of Inland Steel Co., voiced the opinion that even though the steel industry would have a fairly good year in 1962, he could not be "equally encouraging about the outlook for profits." Raw material prices are rising; labor costs are advancing faster than productivity gains; and competition from foreign producers and other materials will put a further squeeze on profit margins.

"The construction industry responds generally to influences at work in the industrial, consumer, and government sectors of our economy," declared Bernard A. Monaghan, president, Vulcan Materials Co., "and since on balance the forces at work in each of these sectors point to an even more prosperous 1962, then the over-all construction industry in 1962 should operate at even higher levels than it did in 1961."

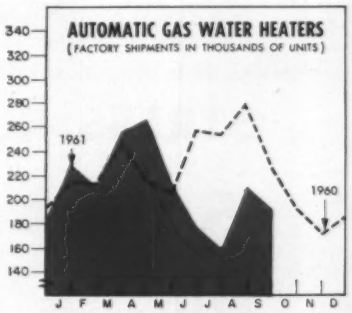
Problems Are Numerous

Those optimistic forecasts could be knocked out of whack if poten-



	1961	1960	1959	1958
Jan.	176	198	186	163
Feb.	181	200	202	157
Mar.	182	199	221	149
Apr.	188	194	218	148
May	194	196	218	152
June	201	197	212	164
July	200	191	216	170
Aug.	201	190	212	172
Sept.	207	190	207	178
Oct.	...	182	204	187
Nov.	...	181	202	189
Dec.	...	176	202	190

*Seasonally adjusted.
Amer. Supply & Machinery Mfrs.' Assn.



Shipments—Units

	1961	1960	1959
Jan.	229,300	215,500	266,200
Feb.	210,400	214,800	259,700
Mar.	255,000	247,300	265,900
Apr.	265,900	216,200	261,300
May	217,700	205,500	239,300
June	178,600	256,000	250,000
July	161,700	254,100	245,100
Aug.	212,800	279,400	256,100
Sept.	191,900*	227,600	243,800
Oct.	.....	192,900	274,200
Nov.	.....	171,400	199,100
Dec.	.....	185,500	192,900
Totals	.....	2,666,200	2,953,600

*Preliminary.
Gas Appliance Mfrs. Assn.

tial problems become serious enough. At least nine possible pitfalls in 1962 were mentioned in the two conferences: 1. International tensions. 2. Inflation. 3. Excessive labor demands. 4. High unemployment. 5. A shift from a federal budget deficit in 1962 to a balanced budget or surplus in 1963. 6. Adverse balance of payments. 7. Stiffer foreign competition. 8. Continued profit squeeze. 9. A continuation of consumer hesitancy about buying durable goods.

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	2,044[1]	2,046	1,470
Electric Power Distributed (million kw-hr)	15,500[1]	15,396	14,505
Bituminous Coal Output (1000 tons)	8,795[1]	8,990	8,126
Crude Oil Production (daily avg—1000 bbl)	7,150[1]	7,154	6,955
Construction Volume (*ENR*—millions)	$255.4	$527.0	$314.4
Auto, Truck Output—U. S., Canada (*Ward's*)	185,889[1]	188,672	167,211
TRADE			
Freight Carloadings (1000 cars)	590[1]	619	565
Intercity Truck Tonnage (changes from year ago)	+8.7%	+7.0%	+1.3%
Business Failures (Dun & Bradstreet)	344	304	317
Currency in Circulation (millions)[2]	$32,968	$32,801	$32,298
Dept. Store Sales (changes from year ago)[2]	+3%	+2%	−4%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$26,263	$29,564	$24,170
Federal Gross Debt (billions)	$295.9	$296.8	$290.5
Bond Volume, NYSE (millions)	$31.4	$30.2	$22.4
Stocks Sales, NYSE (thousands of shares)	19,283	17,949	13,743
Loans & Investments (billions, adjusted)[3]	$117.4	$117.0	$107.8
U. S. Govt. Obligations Held (billions)[3]	$34.1	$34.3	$29.3
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	223.5	224.8	222.4
All Commodities[6]	118.6[1]	118.6	119.4
Commodities Other than Farm & Foods[6]	127.3[1]	127.3	127.9

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

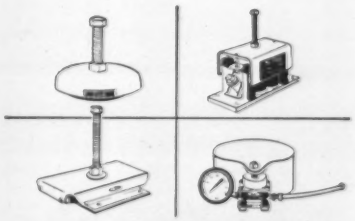
ARE YOU *JUST 4 FEET* FROM EFFICIENCY?

If you have bolted the 4 (or more) feet of your machinery to the floor, you're missing the production efficiency that results from layout flexibility!

With your machinery feet on BARRYMOUNTS®, your own maintenance people can rearrange production lines *quickly*, and without worrying about shock, vibration or noise problems.

Only Barry can offer you *quality-engineered* machinery mounts to answer your particular needs. Three different resilient elements: neoprene, helical springs or air provide the versatility required for every mounting requirement. In addition, you get built-in leveling . . . machine mobility . . . and freedom from shock and vibration effects.

Barry's experience can help you gain higher production efficiency. Why not request a copy of Bulletin 60-04A, "Practical Considerations When Installing Machinery"?



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Division of Barry Wright Corporation

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The Midvac Process of consumable electrode melting eliminates atmospheric contamination, ingot soundness is improved, segregation is reduced, workability is increased and product quality is stepped-up. Midvac Steels are offered in many alloys as billets or forgings to meet the most critical design specifications of jet engine parts, missile and aircraft components and other products requiring properties beyond the capabilities of conventional steels. Let M-H metallurgists help you select the right alloy to meet your product's specifications. Write . . .

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Plants: Pittsburgh, Pa. • Bridgeport, Conn. • New Brighton, Pa.

H MH *Midvac Steels*

VACUUM AND CONSUMABLE ELECTRODE STEELS • BACK-UP ROLL SLEEVES • FORGED STEEL ROLLS • FORGINGS
RINGS • PRESSURE VESSELS • INDUSTRIAL KNIVES • DIE BLOCKS • MATERIALS HANDLING EQUIPMENT

PHILIP R. LOCHNER
Dixon Sintaloy gen. sales mgr.

ROBERT W. FRANK
Birdsboro president

HENRY A. SZOSTEK
Brown & Sharpe div. sales

CHARLES F. SIMMERS
rejoins Morgan Engineering

Philip R. Lochner was made general sales manager for all powder metallurgy products of **Dixon Sintaloy Inc.**, Stamford, Conn. He was district sales manager for National Steel Corp.

Robert W. Frank, former vice president, was elected president of **Birdsboro Corp.**, Birdsboro, Pa. He succeeds **G. Clymer Brooke,** elected chairman.

Paul J. Roddy was made general sales manager, **American Screw Co.**, Willimantic, Conn., division of Noma Lites Inc.

Dr. James W. Moyer joined **Servomechanisms Inc.**, Los Angeles, as director of research, Research & Development Center, Santa Barbara, Calif. He was research director at Sperry Rand Research Center, Sudbury, Mass.

R. S. Segsworth was appointed chief engineer for the Trenton, N. J., Div. of **Ajax Magnethermic Corp.**

Henry A. Szostek was made sales manager, Cutting Tool Div., **Brown & Sharpe Mfg. Co.**, Providence, R. I.

E. M. Swartz was named to the new post of manager of manufacturing for **Idaho Maryland Industries Inc.**, Los Angeles. He was administrative assistant to the president of Natus Corp.

W. Robert Custer was made Cleveland district manager, and **James A. Kelly** was made assistant to the regional vice president of **Luria Bros. & Co. Inc.**, division of Ogden Corp.

James E. Jolliff was appointed vice president-finance, **Judson L. Thomson Mfg. Co.**, Waltham, Mass. He was controller.

Norman Seymour was named to the new post of works manager, **Vard Div.**, Royal Industries Inc., Pasadena, Calif. He was manufacturing manager for Marquardt Corp.

Charles F. Simmers returns to **Morgan Engineering Co.**, Alliance, Ohio, as vice president-engineering. He left in 1959 to become a steel mill consultant and later that year became associated with Koppers Co. Inc. as chief engineer, Engineering & Construction Div.

Doarde G. Triponi was made chief metallurgist, Marion, Ohio, Div., **Eaton Mfg. Co.**

Harold G. Shelton was elected to the new post of executive vice president-operations, **General Aniline & Film Corp.**, New York.

Philip O. Geier Jr. was made general manager, **Cincinnati Milling Machine Co.**, Cincinnati. He has been with the company 22 years. In 1960, he became assistant general manager, and was elected a vice president.

Otto C. Kebernick was named director of marketing for **International Resistance Co.**, Philadelphia, a new

R. S. SEGSWORTH
Ajax div. chief eng.

NORMAN SEYMOUR
Vard works manager

PHILIP O. GEIER JR.
Cincinnati Milling gen. mgr.

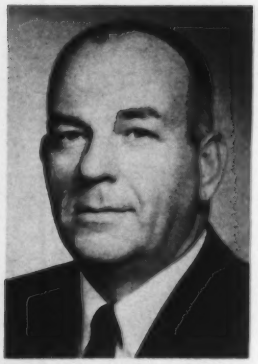
OTTO C. KEBERNICK
Internat. Resistance marketing

JEROME A. RATERMAN

KERMIT T. KUCK

Monarch Machine Tool chairman, president

J. D. MURPHY



J. H. ADAMSON

Kaiser Aluminum & Chemical appointments

post. He was marketing manager of Radiation Inc.

Jerome A. Raterman was elected chairman and chief executive officer of **Monarch Machine Tool Co.**, Sidney, Ohio. **Kermit T. Kuck** was elected president.

Carleton M. Sloat was elected a vice president of **Morris Machine Works**, Baldwinsville, N. Y.

Frank R. Beaudine was named assistant to the executive vice president, **Indiana General Corp.**, Valparaiso, Ind., a newly created post concerned with general corporate operations.

Kenneth P. Duquette was appointed manager of components manufacturing for **KuBar Inc.**, Cambridge, Mass. He was with Miniature Precision Bearings Inc.

Corhart Refractories Co., Louisville, named **John K. Meyer** assistant to the president, and **Benjamin P. Colosky** general sales manager.

J. D. Murphy was named operations manager of **Kaiser Aluminum & Chemical Corp.'s** Wire & Cable Works, Bristol, R. I. He succeeds **J. S. Urbanik**, resigned. **J. H. Adamson** replaces Mr. Murphy as manager of the company's extrusion plant at Halethorpe, Md. Former extrusions sales manager at the Dolton, Ill., plant, he is succeeded by **B. B. Clow. J. P. Jelks** replaces Mr. Clow as assistant sales manager for forgings at Erie, Pa.

George L. Chamberlin was elected vice president-treasurer, **Bell & Howell Co.**, Chicago.

Harry J. Hart was appointed export manager for **Gleason Works**, Rochester, N. Y.

Harold W. Cochran was elected executive vice president of **Caspers Tin Plate Co.**, Chicago. He was vice president-sales.

Charles C. Libby was made marketing manager of **Ideal Electric & Mfg. Co.**, Mansfield, Ohio. He was national sales manager, Industrial Electric Motor & Generator Div., Fairbanks, Morse & Co.

Astor L. Thurman was appointed general manager of **McNally-Bird Engineering Co. Ltd.**, Calcutta, India, a new company formed by McNally Pittsburg Mfg. Corp., Pittsburg, Kans., and Bird & Co., Ltd. Mr. Thurman was president of Lombard Mfg. and vice president of Lombard Corp., Youngstown.

Michael J. Pastrick Jr. was named manager of the Lafayette, Ind., plant of **Rea Magnet Wire Co. Inc.**, subsidiary of Aluminum Co. of America. He succeeds **Lytle Harlan**, who remains as an adviser until retirement.

Leslie G. Wrigley joined the corporate staff of **Illinois Tool Works Inc.** as director of automotive marketing. For the last 20 years, he has been associated in an executive sales capacity with U. S. Rubber Co. in Detroit. He has quarters in ITW's Detroit offices.

JOHN K. MEYER

Corhart Refractories post

HAROLD W. COCHRAN

Caspers Tin Plate exec.

CHARLES C. LIBBY

Ideal Electric marketing

LESLIE G. WRIGLEY

joins Illinois Tool Wks.

John K. Levin was made vice president-manufacturing, **Power Designs Inc.**, Westbury, N. Y. He continues as plant manager.

Alfred E. Kadell, former executive of the consulting engineering firm of Arthur G. McKee Co., Cleveland, was appointed executive vice president of **Screw & Bolt Corp. of America**, Pittsburgh.

Robert H. Mayer was elected president of **Alvey Conveyor Mfg. Co.**, St. Louis. He is succeeded as executive vice president by **Walter H. Oswald**, former vice president-sales.

Gilbert D. Dill rejoins **Wheelabrator Corp.**, Mishawaka, Ind., as staff assistant to the president. He will direct development and research on new applications of blast cleaning equipment for steel mills. For the last two years, he was a private consulting engineer.

General Motors Corp., Detroit, elected **James E. Goodman** an executive vice president, with jurisdiction over automotive, body and assembly, and parts divisions. He succeeds **Sherrod E. Skinner**, retired. **Edward N. Cole** was made group executive, Car & Truck Divisions Group. **Semon E. Knudsen** succeeds Mr. Cole as general manager, Chevrolet Motor Div., and **Elliott M. Estes** succeeds Mr. Knudsen as general manager, Pontiac Motor Div.

Philip C. Jackson was elected executive vice president, **Instru-Coil Co.**, Cincinnati, subsidiary of Cenco Instruments Corp. He also was made general manager of Instru-Coil and its General Spring Div.

Morris W. Reid was elected vice president-marketing, **J. I. Case Co.**, Racine, Wis.

Howard A. Sage was named manager of **E. W. Bliss Co.'s** can machinery plant at Hastings, Mich. He replaces **B. E. Meyer**, recently made general sales manager for the Hastings Div.

Hubert A. Bernet Jr. was elected vice president-sales, **Webster Mfg. Inc.**, Tiffin, Ohio. He was engineering sales manager.

Stanley F. Stearns was named manager, Cleveland Works, **Thompson Ramo Wooldridge Inc.'s** Jet Div.

JOHN K. LEVIN
Power Designs mfg. v. p.

ALFRED E. KADELL
Screw & Bolt exec. v. p.

ROBERT H. MAYER
Alvey Conveyor president

GILBERT D. DILL
rejoins Wheelabrator

J. COLIN SMITH
Alcoa of Australia dir.

SAMUEL B. FISHBEIN
Capehart appointment

J. Colin Smith, former New York district sales manager, Aluminum Co. of America, was named managing director of **Alcoa of Australia Pty. Ltd.**

F. Alan Tiarks was promoted from general sales manager to general manager of **Granco Steel Products Co.**, St. Louis, subsidiary of Granite City Steel Co. He succeeds **Paul K. Nichols**, resigned. **Olaf O. Roberts Jr.** was promoted to general sales manager and is replaced as assistant general sales manager by **Charles E. Eck**, who continues as Granco's highway products manager.

Chrysler Corp., Detroit, elected as vice presidents **Robert Anderson**, director of product planning and cost estimating; and **Alan G. Loofbourrow**, director of engineering.

Robert J. Young was elected president of **Hill Hubbell Co.**, Cleveland, subsidiary of National Castings Co. He succeeds **Milton M. Bowen**, who will continue as a consultant.

Samuel B. Fishbein was made director of military programs for **Capehart Corp.**, Richmond Hill, N. Y. He was with International Electric Corp. as director of customer relations.

J. J. Kroecker was named vice president-sales, **Permold Co.**, Medina, Ohio, to succeed **L. E. DeGroat**, retired.

Edgcomb Steel Co. of New England Inc., Nashua, N. H., named **Bernard A. Martone** product manager of aluminum, and **Charles K. Waters** administrator of aluminum to work in conjunction with Mr. Martone.

Arthur L. Murphy was made Sharon, Pa., district manager-operations, **U. S. Steel Products Div.**, U. S. Steel Corp. He succeeds **James A. Bacon**, now in a similar post at the division's Camden, N. J., district.

Clayton L. Squier was made an assistant general manager of the Lackawanna, N. Y., plant of **Bethlehem Steel Co.** to succeed the late **Hal K. Wilson.**

Railroad Equipment Firms Move to Boost Efficiency

TWO SUPPLIERS of equipment to the railroad industry have taken steps to improve their operating efficiency. Railroad Products Div., American Brake Shoe Co., is spending $2.5 million to convert its Toledo, Ohio, freight car wheel foundry (cast iron) to the production of its Southern, cast steel wheel. ACF Industries Inc. will consolidate all its railroad carbuilding operations in three of its American Car & Foundry Div. plants.

• **Brake Shoe**—Conversion of the Toledo plant will be completed late in 1962. New equipment will include an electric furnace and heat treating equipment. Specialized machining operations will be added. The plant will have an annual capacity of 45,000 wheels.

"The railroads' growing acceptance of the cast steel wheel as standard for freight equipment indicates that Toledo will operate at full capacity as soon as it reopens its doors," says Eads Johnson Jr., first vice president of the division.

The expenditure brings to more than $5 million the amount authorized by American Brake Shoe in the past year to expand facilities for the production of the AAR, standard cast steel, freight car wheel. The cast steel wheel plant in Calera, Ala., was expanded recently; the St. Louis wheel plant is being converted to cast steel wheel production.

• **ACF Industries** — Railroad carbuilding operations of the American Car & Foundry Div. will be consolidated in its Milton, Pa., Huntington, W. Va., and St. Louis plants. The Berwick, Pa., shops (operated by the company since 1899) will be closed in late 1962 upon completion of its work backlog.

"Consolidation and modernization of freight and tank car production facilities at the three remaining plants will result in greater efficiency, considerably reduced overhead, a lower breakeven point, and an improved competitive position," says W. T. Taylor, chairman of ACF.

Under the consolidation plan, the production of tank car underframes will be transferred to the Milton plant, making it an integrated tank car and pressure tank facility. Covered hopper and open car production will be centered in Huntington. Boxcars, piggyback flatcars, and related equipment, including the ACF trailer hitch and cushion cradle, will be manufactured at St. Louis.

The company will continue to maintain design and engineering facilities for passenger equipment—it will offer its services as a consultant to transit agencies and to domestic and foreign manufacturers. It will not build passenger cars.

White Buys Cletrac Line

Oliver Corp., Chicago, has purchased through its parent company, White Motor Co., Cleveland, the crawler tractor business of Cletrac Corp., Chicago. The $5.5 million acquisition included Cletrac inventories, engineering and designs, and numerous machine tools, but not Cletrac's Cleveland plant.

Oliver will consolidate the crawler tractor business into a rearrangement of production facilities at its tractor plant at Charles City, Iowa, where Oliver makes its wheel tractors.

M. A. Hanna Plan Approved

M. A. Hanna Co., Cleveland, will dispose of its direct business interests in iron ore, coal, and marine transportation under a plan approved by stockholders. The firm will become one of the nation's largest closed-end investment companies with assets exceeding $500 million. About 70 per cent of its assets are represented by the stocks of National Steel Corp., Consolidation Coal Co., and the Hanna Mining Co. The balance of its portfolio includes investments in oil, manufacturing, banking, and insurance.

Officers of the firm include: Chairman of the board, Gilbert W. Humphrey; chairman of the executive committee, J. H. Thompson; president, W. A. Hobbs; and secretary, R. B. Ainsworth.

To Build Morey Profilers

New Britain Machine Co., New Britain, Conn., is manufacturing Morey vertical profiling and milling machines. A complete line of Morey profilers will be built in the Cleveland plant of the firm's Lucas Machine Div. They were previously built by Morey Machinery Co. Inc., New York. W. J. Peters, former president of Morey Machine Tool Co. Inc., has joined New Britain Machine Co. He's in charge of profiler operations.

Linde Expands Laboratory

Linde Co., a division of Union Carbide Corp., New York, is expanding its laboratories in Tonawanda, N. Y. The expansion involves a $215,000 addition to provide laboratories and offices for 30 scientists. The new facility will add 10,000 sq ft of space for product development work by Linde's Research Laboratory and for Union Carbide's Silicones Div. Laboratory. Completion is scheduled for March, 1962.

Firms Change Names

Crowe Tool Co., Riverside, N. J., is changing its name to Crowe Tool & Electronics Mfg. Co.

Baldwin-Lima-Hamilton Corp., Philadelphia, shortened the name of its Electronics & Instrumentation Div. at Waltham, Mass., to Electronics Div.

American Machine & Metals Inc., New York, will change its name to Ametek Inc., if stockholders approve at a special meeting in Wilmington, Del., Nov. 22. The company's 13 divisions make a variety of instruments, springs, motors, machinery, and equipment.

McIntosh Stamping Corp., Detroit, changed its name to McIntosh Inc. The firm makes heavy gage, pressed steel parts. It is constructing a $250,000 plant at Berne, Ind., which will be in operation early next year.

G. M. Diehl Machine Works Inc., Wabash, Ind., an affiliate of

the American Gage & Machine Co., Chicago, will now be known as Diehl Machines Inc. The firm makes woodworking equipment.

Ederer Engineering Co., Seattle, changed its name to Ederer Corp. It is in keeping with the expansion of the company's manufacturing activities.

Epps Enlarges Facilities

Epps Industries Inc., Los Angeles, has completed construction of a 7500 sq ft addition to its tube mill at 5000 Pacific Blvd., Vernon, Calif. The addition brings the indoor working and storage area of Epp's three plants to 102,000 sq ft. The company processes sheet and strip steel, pickles and treats steel, manufactures round and square electric weld steel tubing, and maintains an inventory of about 1.5 million ft of tubing in standard lengths, as well as in length multiples of customer requirements.

Plans New Prentiss Plant

Riverside-Alloy Metal Div., Riverside, N. J., H. K. Porter Company Inc., has signed a lease calling for erection of a 100,000 sq ft building in Holyoke, Mass., to house Prentiss Wire Mills, one of the three plants of the division. The plant produces ferrous and nonferrous wire.

Buys Gairing Tool Line

Waukesha Cutting Tools Inc., Waukesha, Wis., purchased some assets of Gairing Tool Co., Warren, Mich. The purchase included Gairing's name, product inventory, jigs, fixtures, special tools, and engineering drawings. Gairing's land and buildings were sold to another firm.

Equipment Firm Expands

Frank W. Egan & Co., Somerville, N. J., has completed a $350,000 expansion program which doubles its plant facilities. The firm makes machinery and equipment. The 38,000 sq ft expansion will allow Egan's extrusion assembly unit to be integrated with the rest of the assembly section. Substantial space has also been added to the sheet metal and machine tool departments.

Opens Offices in New York

Guest, Keen & Nettlefolds Ltd. of England has formed a subsidiary, Guest, Keen & Nettlefolds (South Wales) Inc. with offices at 122 E. 42nd St., New York 17, N. Y. The new firm will handle the parent company's business in steel products, including wire rods, wire, strip, and nails. N. R. R. Brooke is managing director of the subsidiary. The New York office is under the direction of W. G. Stone.

Pesco Adds New Product

Harnischfeger Corp., Milwaukee, has sold exclusive manufacturing and sales rights to its P.&H. welding positioners to Pesco Inc., Pittsburgh. The balance of Harnischfeger's welding products are not affected by the agreement.

Eriez Opens Third Plant

The third plant in Erie, Pa., for Eriez Mfg. Co. will house the firm's recently established Coil Winding Div. John Ziegler, formerly of Electrocoil Corp., Erie, is manager of the new division which will produce magnetic vibrator coils for hoppers, bins and chutes.

Canadian Firm Expands

Provincial Engineering Ltd., Niagara Falls, Ont., will build a 60,000 sq ft addition to its plant at a cost of more than $1 million. The firm is a subsidiary of Houdaille Industries Inc., Buffalo.

Heating Furnaces Added

Vanadium-Alloys Steel Canada Ltd. is adding two ingot and billet heating furnaces to its forge shop and rolling mills in London, Ont. A new building extension will house additional swing grinding equipment, new billet cutting facilities, and a 36 in. production boring mill.

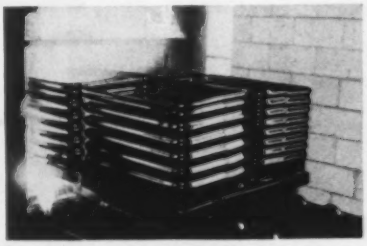
CONSOLIDATIONS

Black-Clawson Co., New York, purchased from Hadfields Ltd., Sheffield, England, the **William Kennedy & Sons Ltd.**, Owen Sound, Ont., previously a division of Millspaugh Ltd., Sheffield. The property will be used to manufacture the complete line of Black-Clawson equipment for pulp and paper mills in Canada. Special machine tools and other equipment are being installed.

Mor-Flo Heater Corp., Cleveland, purchased **Hotstream Heater Co.** and will operate it as a wholly owned subsidiary. Hotstream will continue manufacturing at 2363 E. 69th St., Cleveland.

Dresser Industries Inc., Dallas, acquired the **M. & H. Valves Co.**, Anniston, Ala., and plans to spend more than $500,000 through 1963 expanding the plant's facilities by about 25 per cent. The Anniston operation includes a foundry and machine shop.

Hansell-Elcock Co., Chicago, operator of a gray iron foundry and fabricator of structural steel, has been acquired by **Calar Industries**, that city. The foundry will remain closed.



Alloy Beats Heat

BATCH boxes for heat treating at 1700° F last three times as long when they are made of an alloy called RA-333, claims Maumee Metal Treating Inc., Toledo, Ohio.

The firm treats batches weighing up to 750 lb, many of which are oil quenched in the containers. The first units were removed from service after almost two years' service. Containers formerly used never lasted longer than eight months.

RA-333 contains 45 per cent nickel, 25 per cent chromium, 3 per cent molybdenum, 3 per cent tungsten, 3 per cent cobalt, 1.25 per cent silicon, says the producer, Rolled Alloys Inc., Detroit. (It costs about 60 per cent more than the alloy formerly employed.)

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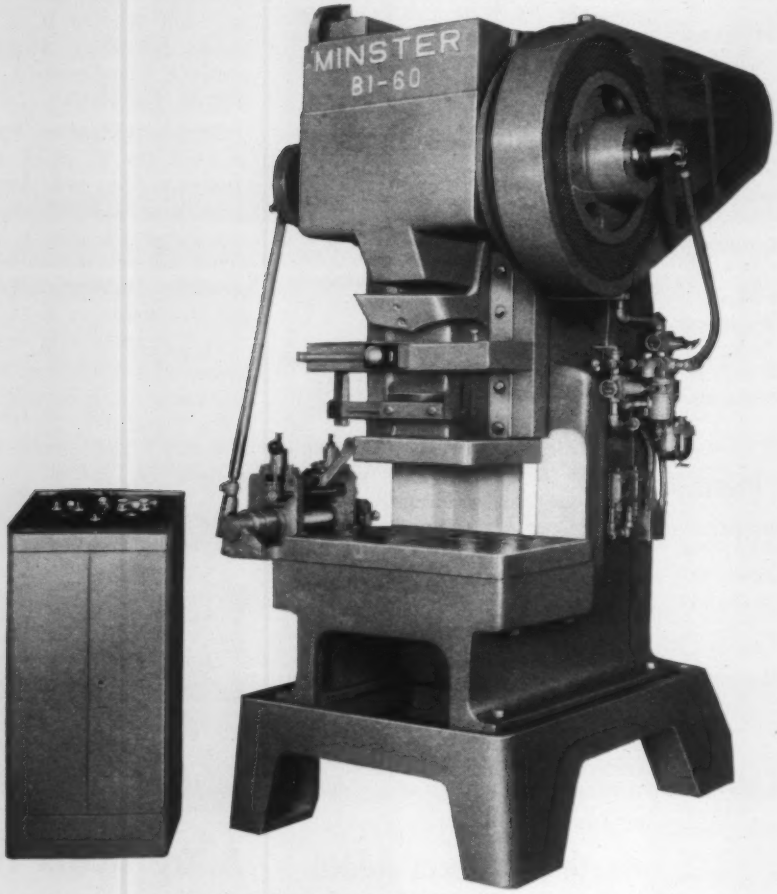
this B1 press will make them faster,
more accurately and at lower cost per part.



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STRENGTH THROUGH PICKLING— A quantity of 0.004 in. titanium wire with an ultimate tensile strength of 300,000 psi was developed by Titanium Metals Corp. of America at its Toronto, Ohio, plant. The firm found that a post-age pickling was needed to realize maximum strength. Probable reason: Pickling improves the wire surface.

MEGALITHIC PRESS— Russia is toying with the idea of constructing several 200,000 ton hydraulic presses (that's four times the size of the big Air Force presses in use in the U. S.) for forging metals. Projected designs would employ much prestressed, reinforced concrete to conserve metal.

IMPROVE COLD TESTERS— A device developed to test metal samples near absolute temperatures (cryostat) can take loads of 10,000 lb, states the National Bureau of Standards. The design is simple, safe to operate, and conserves liquefied gas.

IMPROVES STAINLESS— A high strength (290,000 psi at room temperature), martensitic stainless developed by Crucible Steel Co. of America, Pittsburgh, is said to have better atmospheric corrosion and oxidation resistance than hot work, die steels and higher strength at 1200° F than other heat resisting alloys. The firm says the material can be welded.

TITANIUM-NICKEL INTERMETALLIC— Navy scientists have a new alloy of titanium and nickel (Nitinol) that is nonmagnetic and gets tougher as the temperature drops. It has good ductility (15 per cent reduction at room temperature), can be hardened to Rc 62, welded, and sharpened. It is ideal for nonsparking tools needed in ordnance work.

AUTOMATION WITH A BANG— A proposed method for automating explosive forming and sizing employs "arming" devices which are added to die-blank setups just before they are moved to a protected area for detonation. Afterwards, the die-part setups are cleaned and dried before being returned to the starting position, says Joseph L. Bird, president, Nitroform Corp., Birmingham, Mich.

STUDY HYPERFAST IMPACTS— A supervoltage, exploding wire gun projects particles at 250,000 feet per second, ten times faster than present testing speeds, claims Technical Operations Inc., Burlington, Mass. It will test structures that must resist meteoroids in space.

COOL BATH— A new, solvent type stripper for organic materials (paints, plastics, and the like) works at room temperature, says E. F. Houghton & Co., Philadelphia. It combines an organic solvent, acid phenolic material, and an evaporation retardant, removing coatings which resist caustic solutions.

SOFT COAL TURBINES— "The gas turbine may be a valuable tool for increasing the efficiency of coal in power production," claims Glenn B. Warren, consultant, Schenectady, N. Y. He told technologists at Southern Research Institute, Birmingham, that it was conceivable such devices could use gases from burning underground mines.

NEW THICKNESS GAGE— A beta radiation source is the key to a system which measures metal films as thin as one ten-millionth (0.0000001) in. Called a backscatter gage, it will be manufactured and sold by Twin City Testing Corp., Tonawanda, N. Y., says the developer, Boeing Co., Seattle.

NEW OPTICAL MASER— Bell Telephone Laboratories' research has turned up neodymium in calcium tungstate as a good material for masers (they produce coherent light waves of great penetrating power). Two of its scientists constructed one of the devices and noted that it could operate at room temperatures with a small energy input.

Progress in Casting Demonstrated

A CASTING DESIGN that reduced machining costs 33.4 per cent and over-all costs nearly 21 per cent was one of the five top winners in the $10,000 contest sponsored by the Steel Founders of America Inc., Cleveland. (See cost reduction category below.)

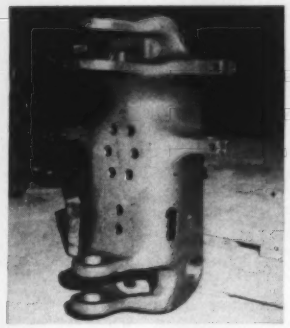
Entries were grouped in these categories: End cost, mechanical design, metallurgical design, redesign or conversion, and unusual or unique design. Purpose of the contest: Demonstrate and encourage progress in the steel foundry industry and stimulate greater use of its products.

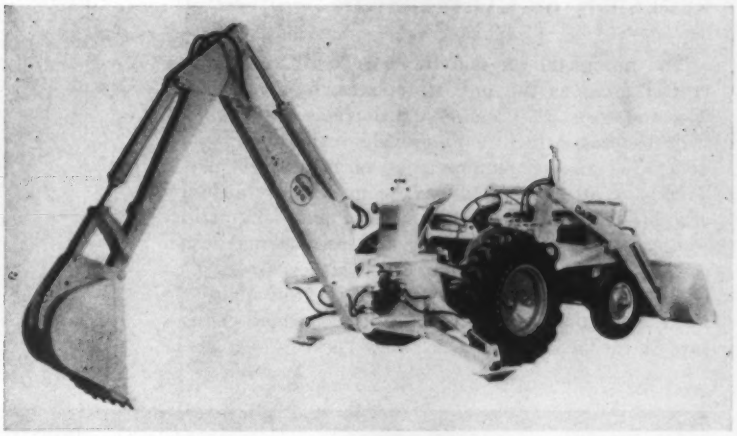
First prize in each division was $500 and a gold certificate. Runner-up awards were also made. Winners were announced at an awards luncheon last week. Here are the top awards:

COST REDUCTION

This power transfer differential housing, made by LeTourneau-Westinghouse Co., Peoria, Ill., had been machined from a billet. The rough billet weighed 944 lb; its finished weight was 292 lb. The rough casting weighed only 322 lb and finished out at 250 lb. Handling in the plant was easier because of the weight reduction, and the minimum order for castings was less than that for billets, reducing the inventory of parts. Service life is expected to equal or better that of the original unit — the first casting has been in field service four years. A change in alloy, when the change to a casting was made, increased the strength of the unit.

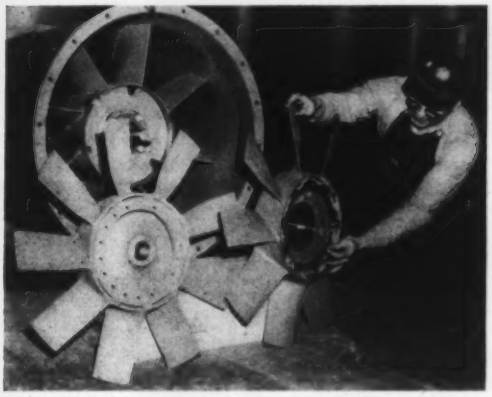
MECHANICAL DESIGN





The cast "swing tower" in this backhoe cost slightly more than the 18-component assembly it replaced. But J. I. Case Co., Burlington, Iowa, the manufacturer, reports that it has eliminated warranty claims. Other design changes made at the same time brought about a net reduction in the cost for the backhoe. The original castings for the tower were made of carbon steel, but it was found that a Type 4140 alloy was needed for strength. The casting is heat treated to 212-241 Bhn hardness. The final design was developed after a series of tests using brittle lacquer and strain gages to locate and assess the maximum strain areas.

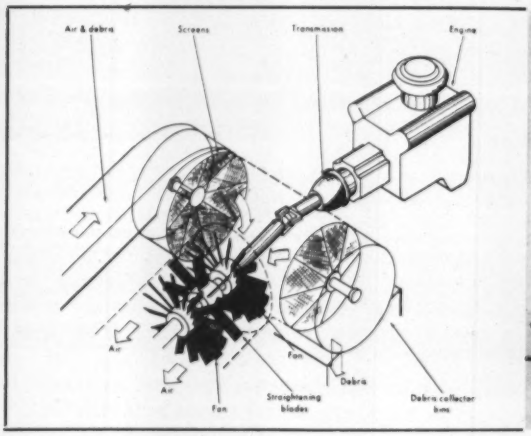
METALLURGICAL DESIGN

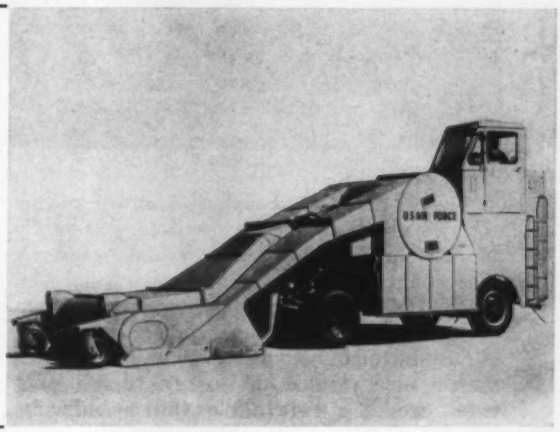


This casting is the fan impeller for a large vacuum cleaner made by Joy Mfg. Co. at New Philadelphia, Ohio. It's used to clean debris from runways for jet engine aircraft; the dirt might damage the engines.

The fan works in an abrasive environment; high stresses are set up as it spins; ambient temperatures range from $-40°$ F to $+125°$ F. A 212 hp engine drives the fan at 3200 rpm—it is tested at 4500 rpm. The integral casting is made of SAE 1030 steel, normalized and tempered to give a yield strength of 40,000 psi and a tensile of 80,000 psi. The casting is poured in less than 6 seconds to get proper detail on the thin edges of the blades.

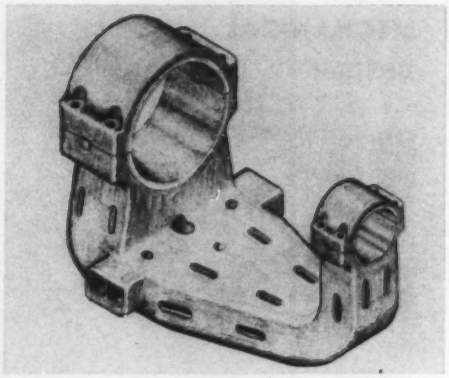
Tests during development showed penetrant and magnetic inspections were adequate to assure quality.

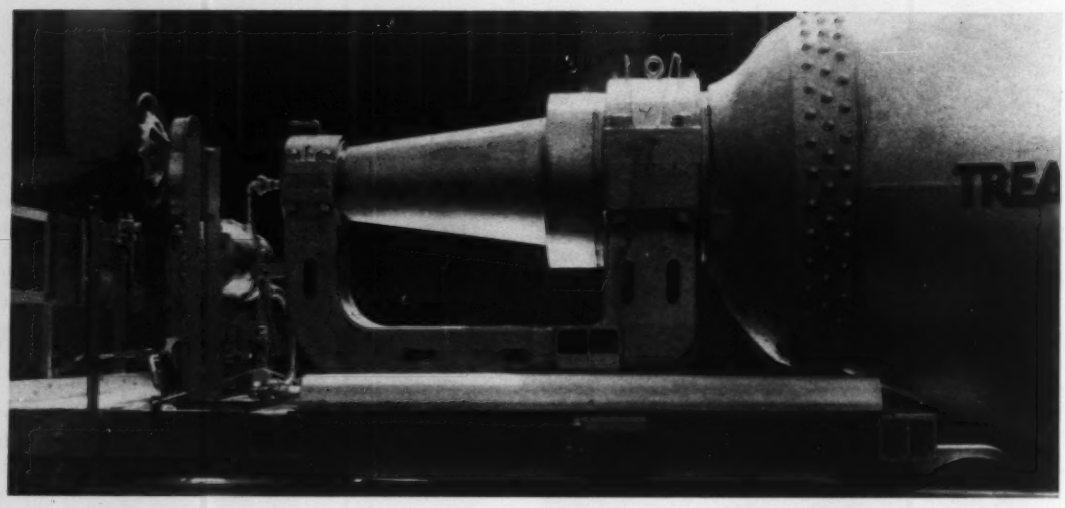




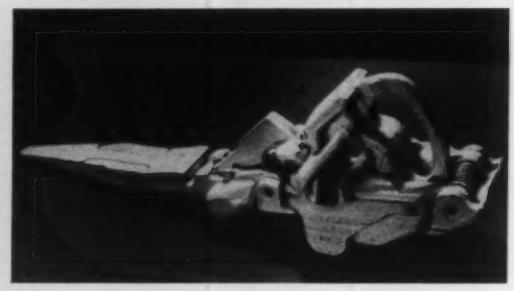
REDESIGN or CONVERSION

The hot metal car end frame is twice as strong in critical areas as the unit it replaces, weighs 7750 lb less, and costs $900 less. Welded plates are combined with the cast structure to provide versatility in wing design—details or requirements vary in steel plants. The basic structure is a box beam with a thick top and bottom. Its internal transverse and longitudinal webs are lighter. The type of steel used to make each casting is selected to match the loads expected. Part of the weight saving is attributed to the ability to make transitions without sharp dimensional changes says M. H. Treadwell Co. Inc., New York.



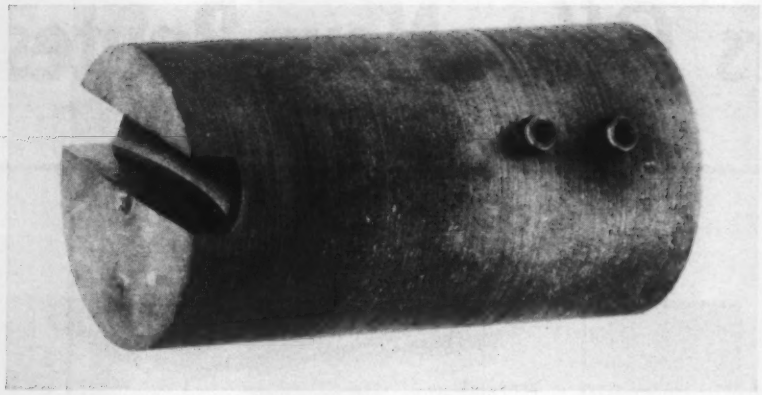


UNUSUAL or UNIQUE

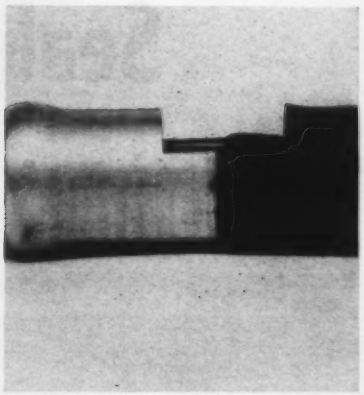


"Skates" for railroad cars are a sort of moving, portable chock. Made by the Safety Skate Co. Inc., Kansas City, Mo., the devices are used in railroad hump yards. Cars roll on the assembly and "skate" to a stop. The new design has several advantages: The skate stays on the track, withstands the high frictional heat developed when the car stops yet does not lose its physical properties, crosses a switch frog without difficulty, and is relatively light.

After the company tried a series of alloys, it chose AISI 8615 steel which is normalized and tempered for this application. Casting is advantageous because complex shapes are required. Machining is reduced. Only 12 holes need be drilled, and they are connected with three pins, three springs, four washers, and one small bolt. The parts are interchangeable in the field.



The deep slot ground in this steel cylinder illustrates the ability of the new grinding wheels to hold a corner, even after severe grinding



Slot cut in steel and rubber simultaneously gives a clean cut on both

Plastic Bond Helps Wheels Do Heavy Duty Grinding

• GRINDING WHEELS with unusual ability to remove metal at high rates and still hold form better than their predecessors—that's what Osborn Mfg. Co., Cleveland, says it is introducing in its Ramron, plastic bonded wheels.

The company says that both the manufacturing methods and the materials used are unique. In announcing the new wheel line, the company claims: "The ability of the Ramron wheel to remove large amounts of metal and still produce a superior finish eliminates the present need for several different types of wheels for completing one grinding job. The . . . wheel does both rough and finish grinding in one operation."

• The company set three goals for the new wheels.

To fill a metalworking need for "abrasive machining," Osborn developers sought a bonded abrasive wheel that would: 1. Remove greater amounts of metal per cut. 2. Stand up under heavier cuts on jobs normally done by milling, broaching, and slotting. 3. Produce parts to close dimensional tolerances.

Company engineers chose standard aluminum oxide as the abrasive for the new line. But the bond is a proprietary material described only as "a unique plastic bond that provides greater strength."

• Tests indicate the wheels can be work horses.

Field tests, says Osborn, show the Ramron wheels will hold form over a longer period than others tested. In one test, for example, the new wheels produced 80 formed corners under production conditions that normally would produce 24 such corners. Wheel life also is an advantage.

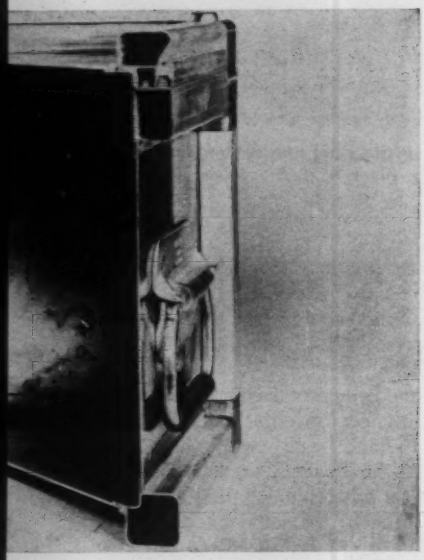
The company says resistance to loading, cool grinding, and the ability to take heavy cuts and to produce fine finishes, make it possible for the wheels to do roughing and finishing in the same setup.

The operating speeds of the new wheels can be extremely high. The company reports: "A wheel, 7 x $\frac{1}{4}$ x $1\frac{1}{4}$ in., has been speed checked at the maximum capacity of the machine, 14,000 rpm (26,000 sfpm) without breaking."

Until full scale production facilities are completed, the company plans to market the wheels "selectively."

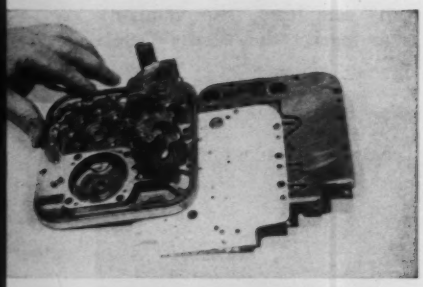
New wheels range in diameter from 7 to 14 in.

Sealers Offer New Routes

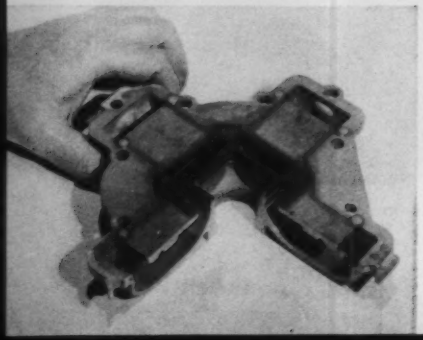


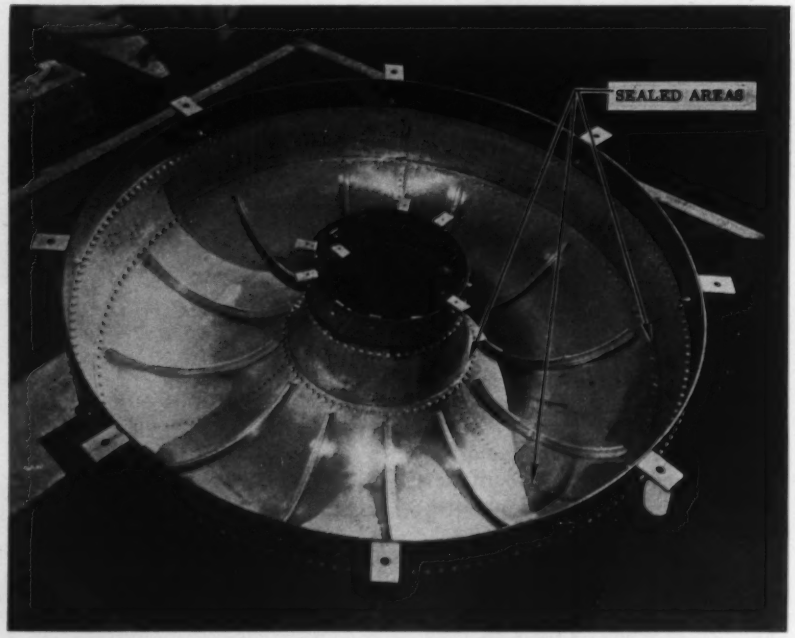
Metal shipping container is joined and sealed almost entirely with a one part adhesive. Extrusions around the edge are joined to corner castings. Integral grooves hold side panels

Seams and side flutings on railroad passenger cars are sealed with an oil soluble, elastomeric compound to prevent moisture penetration and corrosion on inside surfaces



Intricate castings can be made in several parts and joined with adhesives that also seal. The die cut film bonds the halves of a manifold: Several diecastings (below) are similarly joined





This segmented section of the X-15 research plane must hold ammonia. Joints (Inconel riveted to aluminum) are sealed with a film type adhesive which resists −40° F or +300° F

to Better Products

By E. M. CHMIEL

Sealants & Coatings Technical Manager, Minnesota Mining & Mfg. Co., St. Paul

This girl is applying a sealer which contains a high percentage of a heat conducting filler. Heat passes efficiently to outside shell

Workman applies adhesive to the spar of a Convair 880 jet wing. When the skin is laid on top and riveted, the wing is cured in an oven—and presto! A fuel tank

• **THE MOST SIGNIFICANT recent contribution to sealer technology is the liquid polymer that cures in a day at room temperature. The resulting product, a solid rubberlike compound, sticks tenaciously to metals.**

Prediction: Such materials will soon take over the bulk of the sealer market. Reasons: They don't crack or shrink with age and do a better job of preventing leaks—they help metals combat corrosion, dirt, and moisture.

• **Here are some metalworking applications which illustrate how sealers can help you save money and improve quality.**

Zero Mfg. Co., Burbank Calif., cut its costs 25 per cent with adhesives which join and seal watertight, light metal containers. The secret: A one part, high strength adhesive with an epoxy base.

The adhesive seals and joins in one operation. The containers house complex electronic instruments and systems; they also protect delicate mechanical gear during shipment.

Frames of slotted aluminum extrusions are combined with stressed aluminum side sheets. The extrusions are adhesive bonded with corner castings to form the framework. Sides are then inserted in grooves in the extrusions and bonded with adhesive.

• **Complex castings can be built up from several parts economically by joining them with adhesives.**

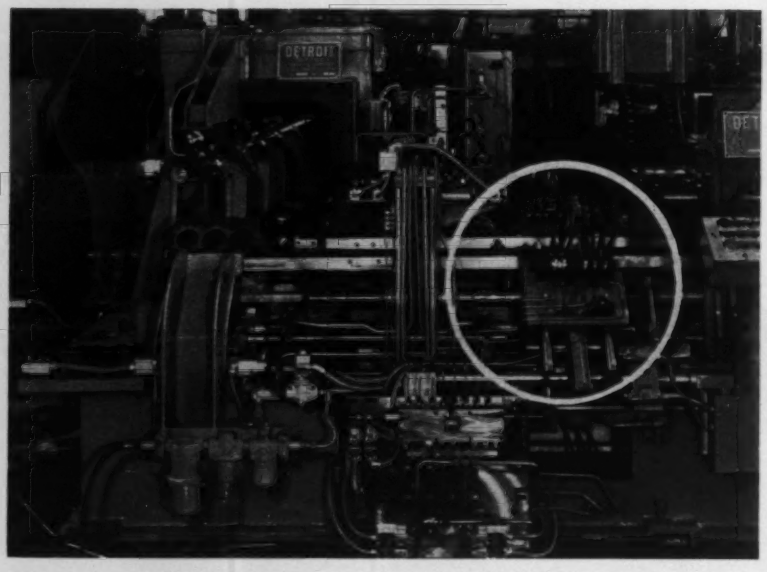
A manifold assembly for a pneumatic control cost 50 per cent less when it was joined with a structural adhesive. The technique takes only one operation instead of five. Result: A superior manifold that can be produced without rejects, and it doesn't fail in service, says Taylor Instrument Companies, Rochester, N. Y. Leak testing is employed on only 10 per cent of the products vs. 100 per cent formerly.

• **Sealers are used in railroad equipment. Examples: Moisture sealing of slides in hopper cars to prevent sugar spoilage; access holes in the roofs of electric railroad cars; seams and rivet openings in the side fluting of passenger cars. (It prevents corrosion under the fluting.)**

Sealers are also important in protecting refrigeration and air conditioning equipment against heat, cold, dirt, and moisture. Sealing is a cheap, practical method of insuring air tightness of cabinets.

An unusual material is used in this field: A nondrying, oil base sealer completely "filled" with a heat conducting solid. Applied between the coil and evaporator (or tubing and outer shell) of refrigeration equipment, it increases the effective heat transfer area and the efficiency of cooling coils.

• **A wide variety of sealers and ad-**



This transfer machine has equipment that automatically adds sealer to 1962 auto engines. It meters precise amounts to several locations on V-6 and V-8 Buick engines blocks to insure leakproof fits around welsh plugs. Careful regulation of quantity holds down costs, says the maker, Detroit Broach & Machine Co., Rochester, Mich. The compound is spun on the inside of water jacket holes. Speed: 180 blocks an hour

hesives is used in aircraft.

The wings of the Convair 880 are sealed with an adhesive which imparts four advantages to the structures:

- Added strength, which compares to that obtained by adding 3/16 in. rivets spaced at three rivet diameters along the wing length. (Standard fasteners handle the primary design load.)
- Joint slippage is prevented, eliminating the enlargement of rivet holes, loosening of rivets, and the development of fuel seepage.
- Fatigue resistance is increased.
- The whole structure is more rigid.

An unusual problem was solved with a sealer by the designers of North American Aviation's X-15 research rocket. The segmented bulkheads of the liquid ammonia tank (Inconel riveted to aluminum) must be sealed so fluid can flow from one compartment to another. The seal selected (a film type) resists ammonia and temperature changes from $-40°$ F to $+300°$ F. Also, the sealer is applied and cured without changing the aluminum's strength.

Specialized sealers for airplane firewalls are effective at 2000° F. A silicone base, two part sealer can be employed where the service temperature is 600° F. The material cures at room temperatures.

• Make your selection from one of six basic types. You can choose one part sealers for simple applications (dirt, dust, moisture), or two part, "rubbery" sealers that resist acids, alkalies, and solvents. Some handle pressures and temperatures up to 600° F. Others will expand 125 per cent of their original volume when heated, filling all voids and joints. Lastly, adhesives seal and bond in one operation.

The decision to use sealers should be made at the design stage.

These are the basic (one part) sealer types:

- Oil soluble elastomers form a positive seal that excludes water, dust, and dirt. They remain flexible and have a service range of $-20°$ F to $+180°$ F.
- Oil resistant elastomers resist fuels and oils. They are flexible at $-20°$ F but have an upper service limit of $+200°$ F. Some set firm and dry into a rubbery substance that ages well.

These are the two part sealer types:

- Oil resistant elastomers require an accelerator for chemical curing. They resist alphatic and aromatic fuels, water, oil, and weathering.
- Natural resins and oils are made into drying and nondrying types.

Drying types contain oils that harden into a tough protective skin over a soft interior. The sealer can be painted.

Nondrying types stay tacky and are placed where they can't be touched. (Examples: Weld-through and heat conductive sealers.)

Both materials adhere to most surfaces.

- Reclaimed rubber bases make highly elastic and low cost sealers. Service temperatures run from $-20°$ F to $+180°$ F, although they will stand more for short periods. You can build in good weather resistance.
- Adhesives provide both a strong bond and a joint seal in one operation.

Two kinds are available: Thermosetting films and one or two part epoxy resins.

• In choosing a sealer, it is important to analyze service requirements. Look at: Adhesion; strength; service temperature; exposure to solvents, water, chemicals, weather, or abrasion; color fastness; and flammability.

Some high temperature sealers stay firm, but they may fail if they are stressed.

High service temperatures can be handled for a short time if you eliminate the stress.

For extreme temperature variations provide a sealer that has elasticity.

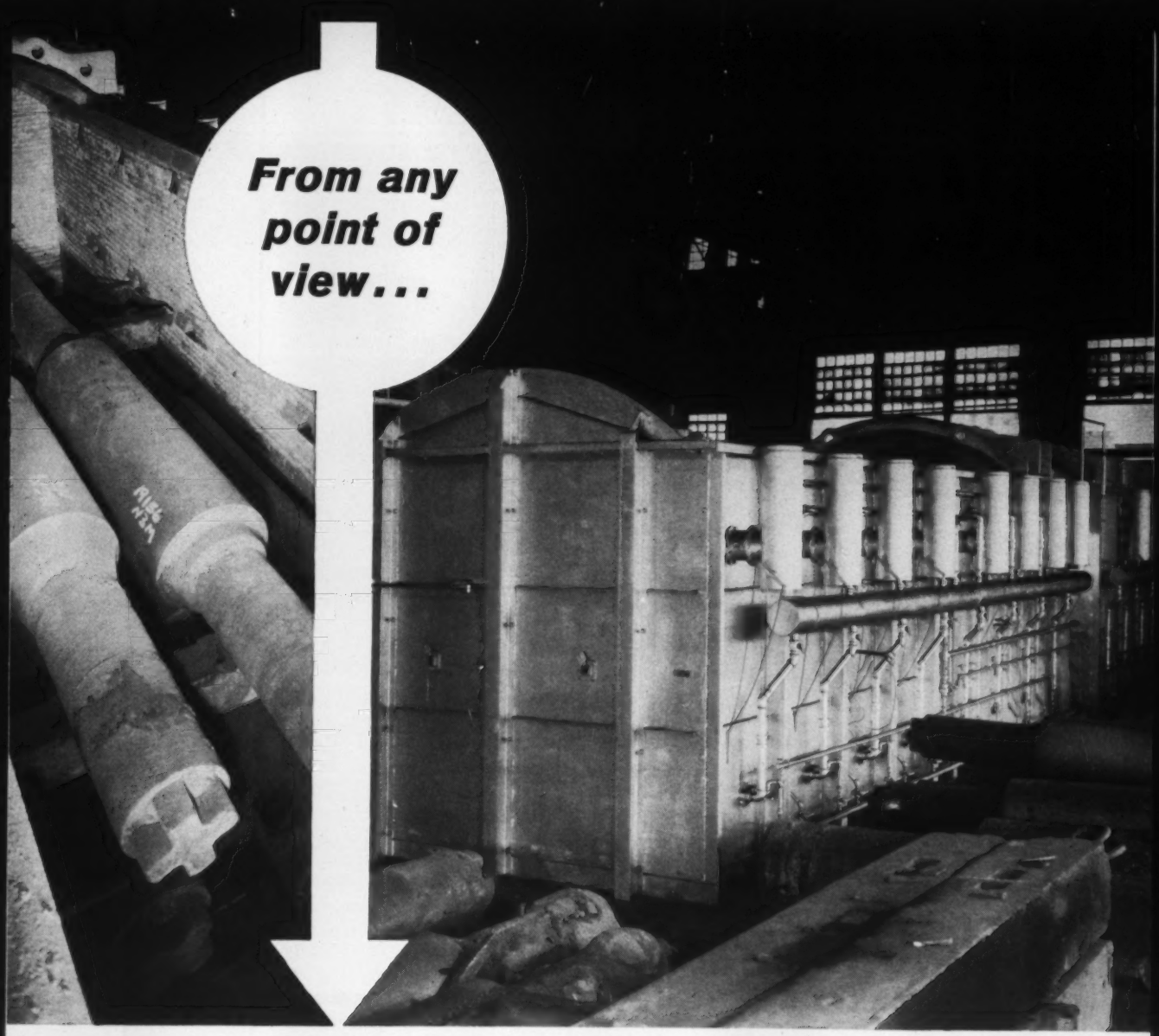
The effects of water, solvents, and oil are accelerated by high temperatures.

A seal can fail if the adjoining surfaces deteriorate. Sealers exposed along a thin line (as at an edge) are not affected by solvents, chemicals, or liquids if absorption is reasonably low.

• How you apply sealers is as important as the material you select.

Sealers have different viscosities, so you match end use and the application technique. Besides manual techniques, a variety of semiautomatic and automatic pressure and spray methods is used.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.



Installation at Pittsburgh Works, Mackintosh-Hemphill Co., Div. of E. W. Bliss

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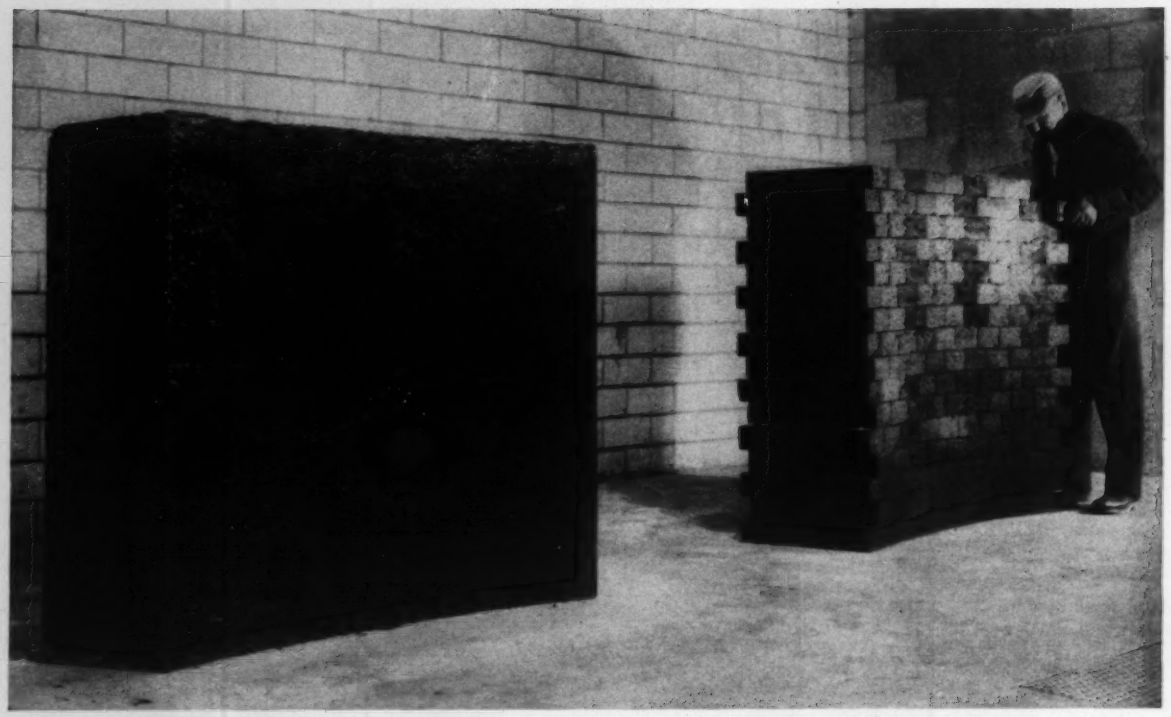

Tar bonded, dolomite blocks replace furnace lining bricks, cut material and labor costs

Up to 300 Bricks Nudged Aside by Refractory Block

LARGE, refractory blocks, each of which will replace up to 300 conventional lining bricks in a steelmaking furnace, will be marketed in the U. S. and Canada by Basic Inc., Cleveland.

A fully integrated facility for manufacture of the blocks is under construction at the company's Maple Grove (Ohio) Works. It is scheduled to start production by mid-1962.

● **Italian Development**—The blocks will be made under an exclusive license agreement with two Italian firms—Dolomite Franchi S. P. A., Brescid, and Ing. Filippo & Carlo Tassara S. P. A., Genoa.

Seven refractory producers in Germany, France, Italy, Sweden, and England are licensed to manufacture the blocks for European steel producers, under the so-called Crespi patents. But no comparable product has been available to steelmakers in the U. S. and Canada.

Pilot production of the blocks in several sizes will be started immediately by the Cleveland firm.

● **Economies Offered** — Substantial operating economies are expected from the new lining materials in several steelmaking processes. Example: Savings on brick costs may run as high as 40 per cent in electric furnaces. Labor cost reductions may reach 30 per cent.

Significant savings are anticipated through the installation of such linings in oxygen steelmaking units. Increased furnace availability is expected to provide higher production and greater operating efficiency.

The blocks also are expected to reduce relining costs for open hearth furnaces and foundry cupolas. They have been used successfully in Europe to line open hearths, electrics, Thomas converters, and vertical kilns for burning lime.

● **Several Sizes**—The refractory sections, called Basiblok, are produced from dead-burned dolomite and coal tar pitch. Reinforced by an internal steel framework, the blocks will be made in sizes up to 60 cu ft and weighing up to 6 tons. One unit of that size, 72 in. high, will replace about 300 of the smaller bricks normally used to line sidewalls.

The blocks are set into place in the furnace by an overhead crane or special handling equipment, to form the refractory sidewall lining. That eliminates much of the labor involved in handling and laying many small bricks to achieve the same result.

Cost of maintaining blocks in service is comparable with that when conventional bricks are used, says Basic. Normal maintenance procedure: The lining is patched with basic refractory material applied with a pneumatic gun.

METALGRAMS

. . . news of "Electromet" ferroalloys and metals

UNION CARBIDE METALS

NOVEMBER 1961

COLUMBIUM -- AN OLD ELEMENT WITH NEW USES -- Although columbium was discovered by Hatchett in 1801, it did not find any metallurgical uses until the 1930's. Then, Union Carbide Metals found that columbium prevented intergranular corrosion of 18-8 stainless steels, allowing welding. Other UCM findings: (1) Columbium improved the strength and toughness of plain-carbon and low-alloy high-strength steels; (2) Columbium reduced air hardening in plain-chromium stainless steels; and (3) Columbium increased the strength of high-alloy compositions at high temperatures. These applications find wide commercial use today.

* * *

COLUMBIUM STEELS CAPTURE HEADLINES -- Recently, a lot of interest has been shown in carbon steels containing a pinch of columbium. Up to 0.03 per cent improves strength and weldability with only a minor loss in ductility. At a price only slightly more than plain-carbon grades, the high-strength of these steels offers cost savings by permitting designers to use lighter sections. Today, columbium steels are being used in trucks and trailers, earth-moving and construction equipment, oxygen cylinders, and line pipe.

* * *

GROWTH PROBLEMS -- Columbium steels are having growing pains, though. Of some concern has been the transition temperature from ductile-to-brittle fracture. Although satisfactory low-temperature impact properties have been obtained in plate thicknesses up to 3-8 in., the transition temperature of heavier plate sections has increased. Research has shown that higher manganese contents, water quenching off the hot mill, or normalizing can improve heavier section impacts. For more information, write for the article, "Columbium in Carbon Steels," in the Fall 1961 issue of UNION CARBIDE METALS REVIEW.

* * *

FERROCOLUMBIUM AND COLUMBIUM METAL -- Union Carbide Metals has been producing high-quality ferrocolumbium and ferrotantalum-columbium for steel and high-temperature alloys since 1935. Now, UCM also offers electron-beam-melted ingots of columbium metal -- the purest columbium available. Columbium metal and columbium-base alloys have many potential uses. Their superior strength at high temperatures suggests many aircraft and space-vehicle applications. Their resistance to molten salts opens up chemical-equipment uses. Columbium's moderate neutron cross-section allows use in nuclear-reactor structures. Alloys of columbium are also being widely tested as superconductive materials. For more information, write for F-20,133 on ferrocolumbium, data sheet Cb-1 on columbium metal, and the article, "Mill Products Multiply," in the Fall 1961 issue of UNION CARBIDE METALS REVIEW.

* * *

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Moline Iron Works, Moline
Moline Malleable Iron Co., St. Charles
National Castings Co., Cicero 50
Peoria Malleable Castings Co., Peoria 1
Wagner Castings Company, Decatur

INDIANA
Albion Malleable Iron Company, Muncie Division, Muncie
Link-Belt Company, Indianapolis 6
National Castings Co., Indianapolis 22

IOWA
Iowa Malleable Iron Co., Fairfield

MASSACHUSETTS
Belcher Malleable Iron Co., Easton

MICHIGAN
Albion Malleable Iron Co., Albion
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MINNESOTA
Northern Malleable Iron Co., St. Paul 6

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Mississippi Malleable Iron Co., Meridian

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Laconia Malleable Iron Co., Laconia

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Westmoreland Mall. Iron Co., Westmoreland

OHIO
American Malleable Castings Co., Marion
Central Fdry. Div., Gen. Motors, Defiance
Dayton Mall. Iron Co., Ironton Div., Ironton
Dayton Mall. Iron Co., Ohio Mall. Div., Columbus 16
National Castings Co., Cleveland 6

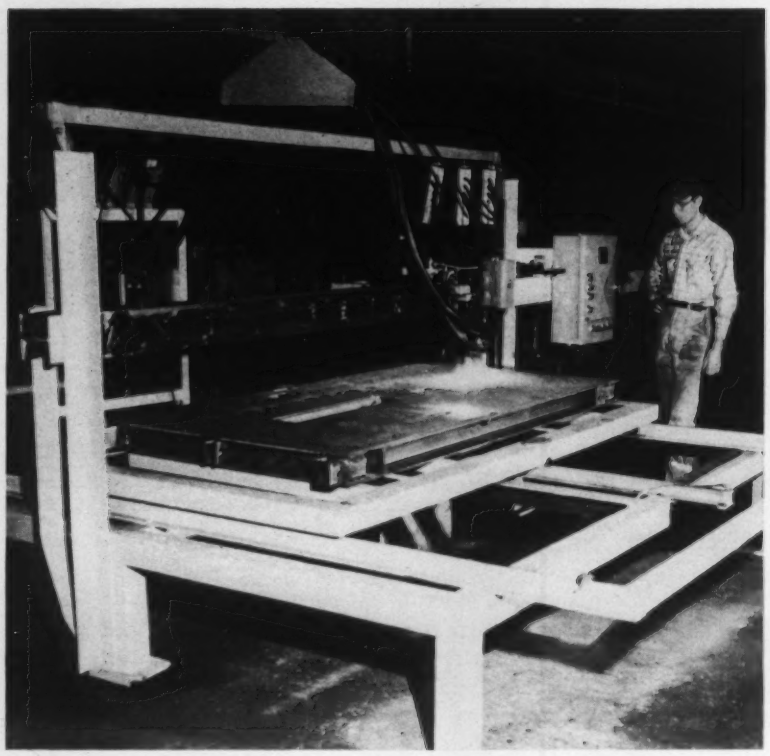
PENNSYLVANIA
Buck Iron Company, Inc., Philadelphia 22
Erie Malleable Iron Co., Erie
Lancaster Malleable Castings Co., Lancaster
Lehigh Foundries Company, Easton
Meadville Malleable Iron Co., Meadville
Pennsylvania Malleable Iron Corp., Lancaster

TEXAS
Texas Foundries, Inc., Lufkin

WEST VIRGINIA
West Virginia Mall. Iron Co., Point Pleasant

WISCONSIN
Belle City Malleable Iron Co., Racine
Chain Belt Company, Milwaukee 1
Federal Malleable Company, Inc., West Allis 14
Kirsh Foundry Inc., Beaver Dam
Lakeside Malleable Castings Co., Racine
Milwaukee Malleable & Grey Iron Works, Milwaukee 46

These companies are members of the Malleable Castings Council



Fixture Speeds Arc Spotwelds

• ARC SPOTWELDING has been given a sixfold speedup by a relatively simple fixture at General American Transportation Corp., East Chicago, Ind., says the plant manager, Charles Mitchell.

He points out that the device completes 176 spotwelds in 9 minutes—a job that used to take 1 hour with manual guns. "And they required a great deal of maintenance," he states.

• The fixture has two, automatic, Sigma spotwelders which join steel bulkhead parts for freight car load dividers. The unit was designed and built by Linde Co., a division of Union Carbide Corp., New York. Parts were "off the shelf" items.

The dividers fit snugly against car lading to prevent movement during shipment. Each is a sandwich of 14 gage, steel sheets attached to 3/16 in. channels. Sheets are painted inside with aluminum, then tackwelded to the sandwich filling at two corners of one long side. That permits the sheet to expand during welding.

A hydraulic clamp on the fixture holds the top against the back to relieve the torches of any pressure and to eliminate a possible maintenance problem. The torches make simultaneous spotwelds on 4 in. centers. (Settings: 460 amperes, 35 volts, direct current, reverse polarity, with 3/32 in. electrodes. Argon with 5 per cent oxygen at 20 cu ft an hour provides the shield.)

The fixture bed moves the door beneath the torches to complete a row of eight spots. Torches and hydraulic clamp then move across the work on a sidebeam carriage to the next row and so on until all 22 are completed.

Vertical torch motion is hydraulically actuated. Microswitches on side beam and fixture bed raise and lower the torches automatically when they reach operating positions.

Now—Finishes Add Beauty to Tough Malleable Castings

Beautiful, protective finishes on tough Malleable iron castings will give your products a superior combination of appearance, ruggedness, and economy. Get complete information on this sales-getting combination from any of the progressive companies that display this symbol —

New Ideas for your products are suggested in Data Unit No. 115, available free from any member of the Malleable Castings Council, or write to Malleable Castings Council, Union Commerce Building, Cleveland 14, Ohio.

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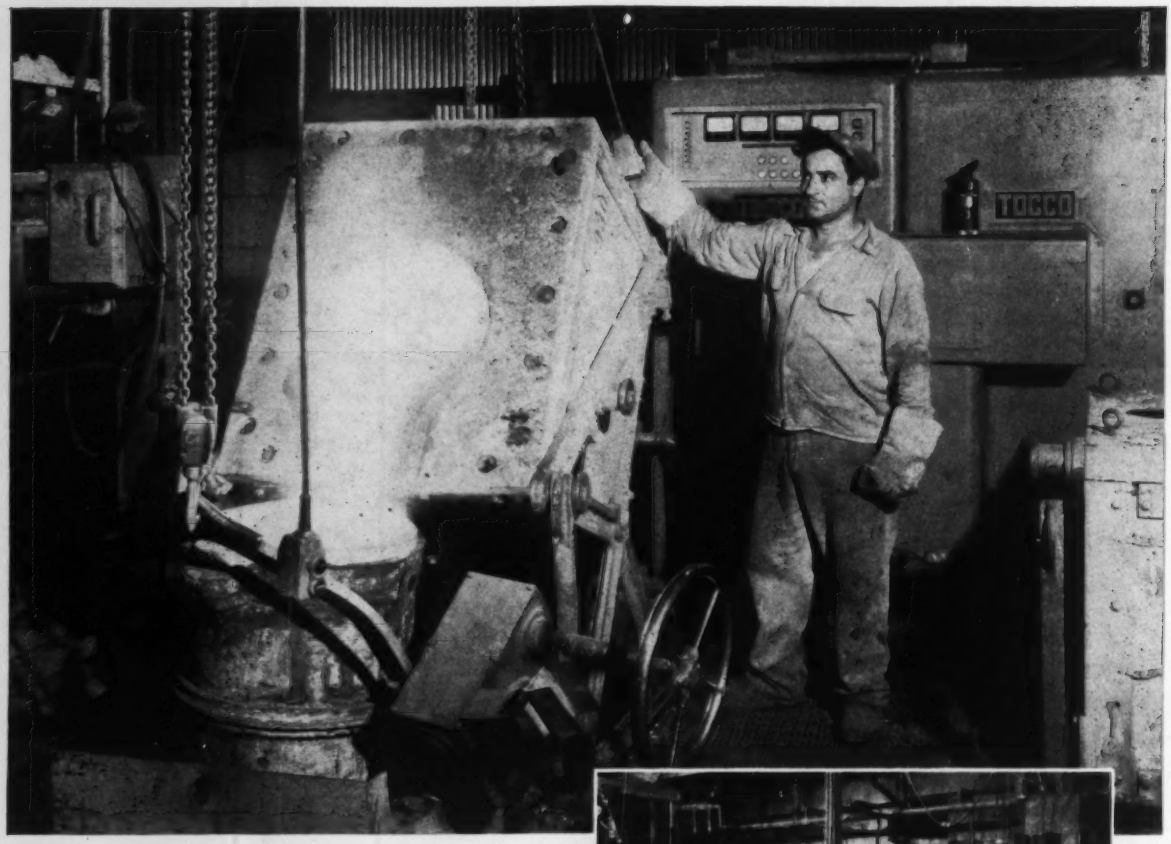
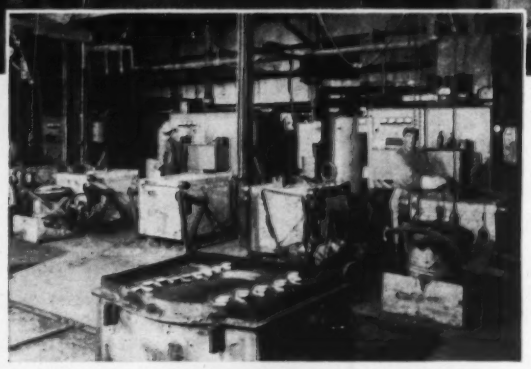
The castings shown have been painted, blued, chromium and cadmium plated, plastic coated, porcelain enameled, galvanized, and machined.



Precision Castings "Delivered" Overnight... in 50,000 lb. Batches



Six 600 pound TOCCO melting furnaces are powered by 700 KW of 3000 c.p.s. power at Commercial Shearing and Stamping Company, Youngstown, Ohio.

Steel casting backlogs at Commercial Shearing and Stamping Company used to lag from 8 to 10 weeks behind production schedules. By installing six 600 pound TOCCO melting furnaces, melting capacity was upped to 50,000 pounds a day—with just three operators.

Among advantages of TOCCO Induction melting are: (1) fast heating cycles—just 48 minutes for a 600 pound charge; (2) accurate control—TOCCO's completely automatic heating assures uniformity of castings; (3) cool, clean working conditions compared to conventional foundry heating methods.

If you're interested in maximum quality control, lower operating cost and rapid melting, it will pay you to learn more about TOCCO Induction melting.

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Shaw Process Pares Mold Cavity Cost

• FAST DELIVERY, precision reproduction, and low cost: Those benefits are cited by a maker of plastic toys that specifies the Shaw process for mold cavities.

Mold production lag time and costs were reduced 75 per cent vs. those of conventional moldmaking techniques. Only minimum machining is required.

• The mold is used to produce a line of plastic automobile kits.

The company is primarily interested in getting the mold produced in the shortest possible time without penalties in quality or cost. Low cost is essential because the mold has a short life—styles are changed every time Detroit brings out new models. The moldmaker (Advanced Casting Corp., Brooklyn, New York) is licensed by the Shaw Process Development Corp., a division of Avnet Electronics Corp.

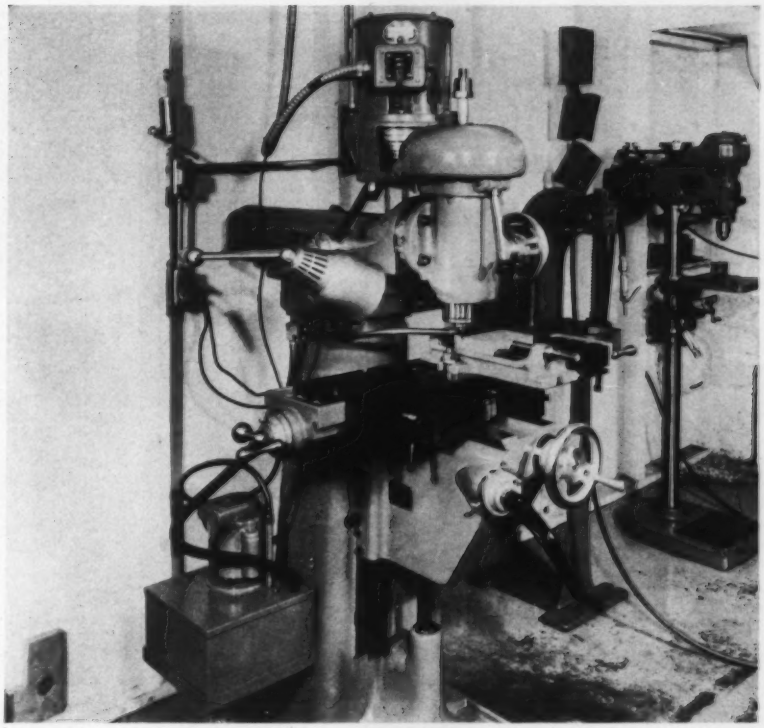
Other applications include cast injection molds, blow molds, diecasting dies, glass molds, rubber molds, and powdered metal press molds.

• Here's how the molds are made for the toymaker.

Plaster replicas of the cavity halves are placed in a flask mounted on a standard wooden pattern board containing a gating system like those used in conventional casting. The special ceramic slurry is then poured into the flask. It solidifies in a few minutes. The Shaw mold at this step is easily stripped from the plaster patterns.

By setting fire to the mold, a pattern of microcracks develops throughout, similar to the cracking of dried mud. Thermal expansion and contraction of the ceramic mold are absorbed in the open areas of the microcracks.

When the ceramic mold has cooled, it is ready to receive the charge of molten beryllium copper. (Any castable metal suitable for the application may be used, says the moldmaker). After the metal has cooled, the ceramic material is removed by sandblasting, and the injection mold cavity is ready for heat treating and polishing prior to being put into the die set.



User reports improved accuracy, finish on a great variety of parts and materials

Vertical Mill Produces Big Savings in Labor, Time

• SAVINGS of 85 per cent in labor and 90 per cent in time were made possible by a dovetail ram and turret vertical mill at D. J. Campbell Co. Inc., Waukesha, Wis. Accuracy is 20 per cent greater, and finish is 70 per cent better than that of previous methods.

Tolerances are regularly held to ±0.001 in.—and ±0.0005 in. is possible. Campbell acquired the machine, a U. S. Millrite, during an expansion of facilities. The machine (made by U. S.-Burke Machine Tool Div., Cincinnati Mfg. Corp., Cincinnati) is used primarily for design and development of components for air powered assembly tools and automatic assembly machines.

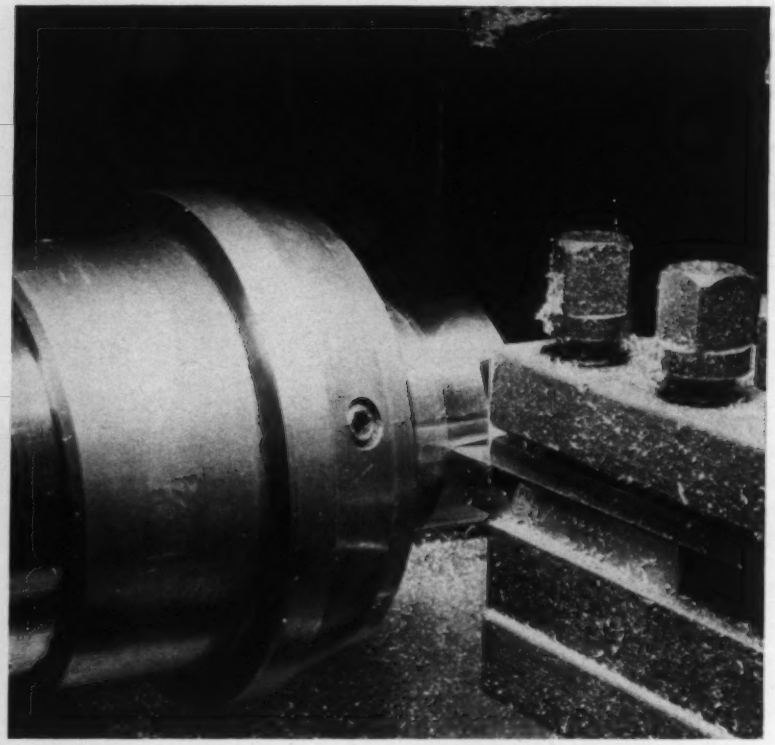
• Much of the unit's usefulness is attributed to flexibility that permits double angle head settings and a wide assortment of setup possibilities.

A great variety of materials and parts are processed. Part sizes range from ¾ x ¼ x ¼ in. to 18 x 10 x ⅜ in.

Operations include drilling, slotting, boring, sizing, and cutoff. A variety of cutters is used, including end mills ranging from ⅛ to ¾ in. (diameter) at spindle speeds of 425, 750, and 1120 rpm.

The machine is powered by a ¾ hp, 900 rpm motor. Six alternative spindle speed settings range from 185 to 2500 rpm. The table working surface measures 7 x 27 in. The longitudinal table feed is 16 in. Crossfeed is 8 in. Other features: Vertical knee travel, 15 in.; ram movement, 12 in.; quill travel, 4 in. The Millrite takes up 50 x 60 in. of floor space.

Two passes take off about 0.004 in. of stock, as . . .



Anodized part at top is diamond turned, leaving only the black in the rolled letters. The technique has eliminated the need for engraving

Special diamond wheel grinds a concave curve in a glass lens

Diamonds Finish Camera Lens Parts

• TO GET a velvet glide in the zoom lenses of Bell & Howell Co.'s new cameras, production men are finish machining some parts with diamond pointed turning tools.

The problem is one of precision. In the Chicago company's 414P camera, for example, the zoom mechanism must glide smoothly from the wide angle to the telephoto position at the touch of a power button. If the 11 element lens should respond erratically, either at regular speed or in slow motion, the resultant jerks would show up in the film sequence. A flawless finish on the moving parts assures uninterrupted sequences.

• The consistency of the diamond cut is the chief advantage.

About 24 parts are turned to about a 16 microinch rms finish with the diamonds. Most of the parts are aluminum—a few are brass. The aluminum parts are turned at 2700 rpm lathe speed. A mist coolant is applied to the single point diamond tool. The diamond tip is shaped to its proper geometry—then relapped only after turning about 4000 parts.

Some of the lens parts have knurled surfaces or are marked with lettering and figures. Conventional lathe tools, says Bell & Howell, often shear or skip when turning across the markings. The diamond tools do not damage the sharp edged designs.

Also, the company has been able to eliminate the engraving of metal parts by rolling the letters into the metal slug, then anodizing the entire surface of the part with a black finish. When the part is diamond turned, only the black finish in the indented designs remains.

Another Test System at work...

J. E. Rambo, (center) Magnaflux Field Engineer discusses test operations with Chief Metallurgist S. W. Gearhart, and Operator Richard Erich, Birdsboro Corporation, Birdsboro, Pa.

Cuts Test Time on 1½-ton Castings from 8 Hours to 30 Minutes

New Magnaglo Unit Eliminates Production Bottleneck

The problem was easy to see—too much time and too high costs by older methods for inspecting big, complex-shaped castings. This new Magnaglo CRV-8 solved it with these results: . . . Testing time was reduced 90%, number of tests per casting was reduced 55%, four operators were released for other production tasks. *The CRV-8 will have paid for itself in its first year of inspection!*

Such results are possible with large castings and complicated welded or cast-weld assemblies because of the recently developed multi-directional magnetization with 8,000 ampere current, or more. One, two or three quick directional "shots," inspect under black light and the whole job is done—by one man! Every defect you *need* to find is precisely located and defined. No over-inspection, no under-inspection.

This multi-directional magnetization is another example of Magnaflux's ability to engineer and supply Test Systems for just about any nondestructive test requirement—common or highly specialized—with standard, productionized-standard, or custom units. Do you have a test need? Tell the Magnaflux Field Engineer, or write Magnaflux Corporation, 7312 W. Lawrence Avenue, Chicago 31, Illinois.

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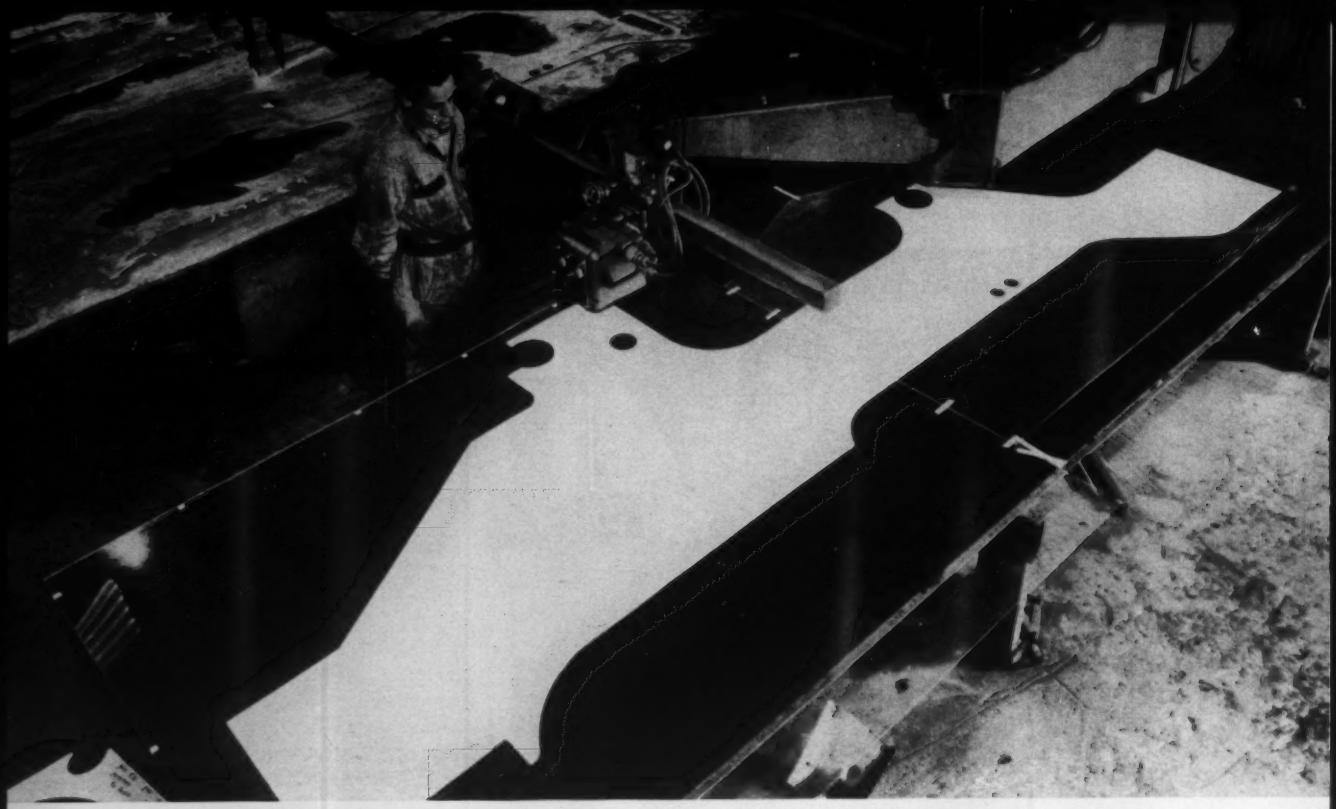


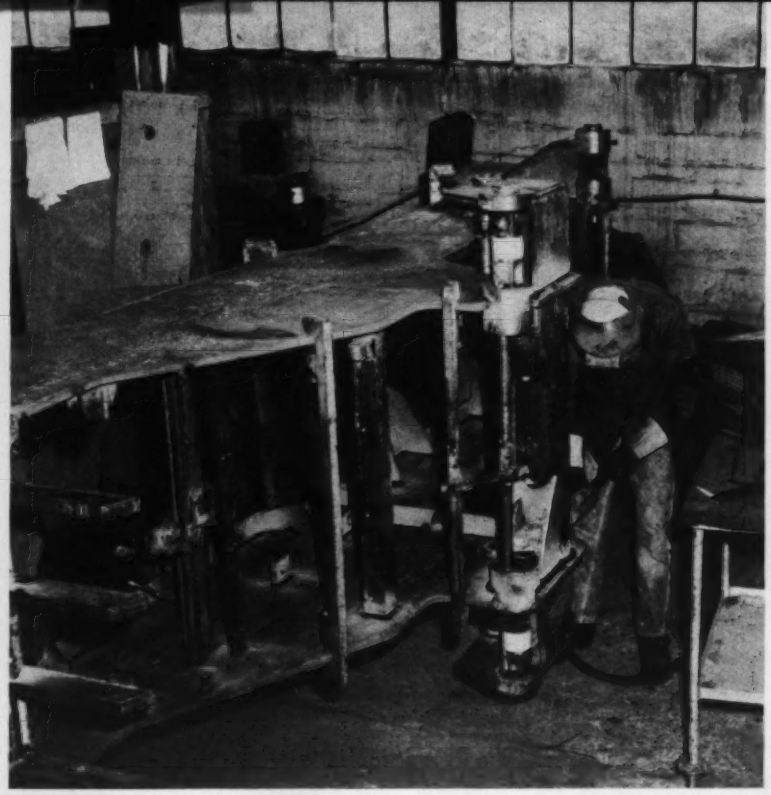
Semiautomatics Cut Welding Time 30%

Welded lift arm assembly for Trojan tractor shovel is lighter, stronger, and stiffer than former model, officials claim. Reasons: Welded construction, plus the use of low alloy, high strength steel

• IMPROVED welding techniques have reduced the joining time of tractor shovels 30 per cent, claims Norman Gillard, structural superintendent, Trojan Div., Batavia, N. Y., Yale & Towne Mfg. Co.

He attributes the savings to semiautomatic equipment which has replaced most of the manual "stick" electrode welding in the plant.

In addition, an electronically controlled machine enables operators to flame cut up to five pieces simultaneously—shaped parts for the tractors used to be made one at a time. The new equipment also eased the cutting of large parts; for example, lift arm side rails were formerly made from three joined pieces. The device also employs fairly inexpensive templates.



Frame sides for this tractor shovel are cut two at a time by an Airco, electronically controlled flame cutter. Operator joins parts of all-welded frame with semiautomatic equipment

• Low alloy steels, efficient fixturing, flux-cored welding wire also contribute to higher output, improved quality, says Mr. Gillard.

Bucket shells are made of U. S. Steel's Man-Ten. Side plates for the truck lift arm are made of Tri-Ten. Those alloys are better than low carbon steels, states Mr. Gillard, because they are stronger and have greater resistance to corrosion and abrasion. Welding can be done without preheating.

Bucket plates are flat or roll formed. To insure good fitup, components are placed in a clamping fixture and tackwelded. "The fixture has increased production 50 per cent and improved dimensional control," states Mr. Gillard. Air cylinders pull the rolled sheet tightly against the fixture contour. External reinforcements and pivot plates are added later.

After tacking, buckets are finish welded in an Aronson positioner. All welding used to be done with low hydrogen stick electrodes, but semiautomatic Dual Shield equipment (made by National Cylinder Gas Div. of Chemetron Corp.) is faster and deposits a smoother weld, says Mr. Gillard. For example, a ¼ in. fillet weld can be made at 18 ipm compared with the 13 ipm speed of conventional stick electrodes. Gas consumption is about 40 cu ft an hour (Cost: 33 cents).

The combination of flux (from the hollow cored wire) and carbon dioxide makes slag removal easy, even when multipass welds are used. CO_2 helps to increase weld penetration. Although the 3/32 in., hollow cored wire costs 50 per cent more than the stick electrodes, the expense is more than offset by the reduced welding time.

The semiautomatics are also employed to join the low carbon steels in the main frame of the truck. SAE 1060 steel is suitable for bucket cutting edges and skid bars. SAE 1117 bushing bosses are welded without difficulty to the Tri-Ten lift arms.

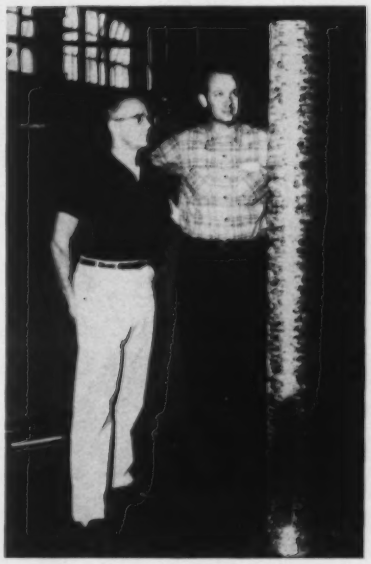
Yale & Towne Mfg. Co. gives much of the credit for economy to the Airco tracer which cuts several pieces at once eliminating the variations normally found in manually made parts.

Tungsten Parts Cast Under High Pressure

ROCKET nozzle liners and jet vanes, made from tungsten, are being cast with the assistance of centrifugal force at Oregon Metallurgical Corp., Albany, Oreg.

The cast material from which the parts are made is produced by arc melting in a vacuum, followed by vacuum pouring of the molten metal into a rotating graphite mold. The centrifugal force of the spinning mold is exerted on the solidifying metal. The process is labeled HPC (High Pressure Casting).

The company says the HPC material is directly forgeable without prior breakdown due to the fine grain structure as-cast. Grains are said to be about a fifth the size of arc cast metal.



Refractory Metal Advance

A 1500 LB tantalum-tungsten ingot, 7 in. thick and almost 6 ft high, has been cast at Temescal Metallurgical Corp., Berkeley, Calif., in its new, three story high, electron beam furnace (STEEL, July 24, p. 105). Significance: Production of larger missile parts.

The purified ingot consists of 90 per cent tantalum, 10 per cent tungsten. The relatively easy to fabricate alloy withstands temperatures from −420° F to +6500° F.

Here's how to contact such a man

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WITH THE HELP of quickly available extrusion specialists, more and more companies have discovered that they can now save substantially by replacing rolled, crimped, welded, machined and assembled parts with low-cost aluminum extrusions.

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A helpful product analysis is just one reason, however, for calling on an independent extruder. *Fast service* is another. He's at hand when you need him. Your order is important to him. And it doesn't have to wait for hundreds of others.

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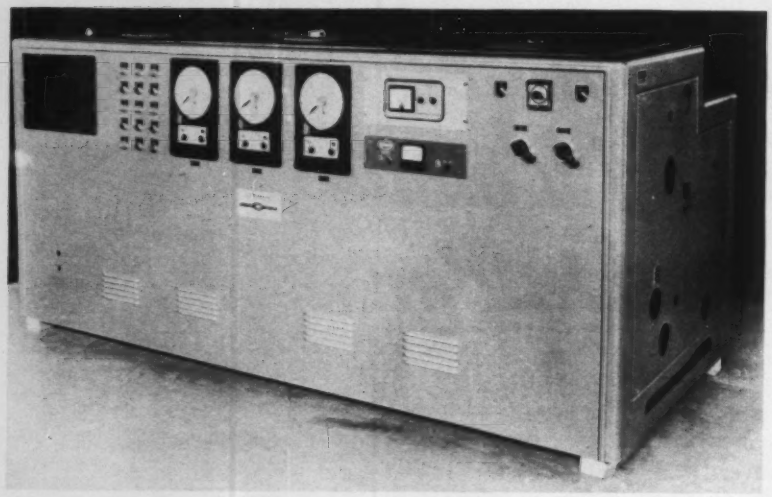
Vacuum Conveyor Furnace Processes Continuously



VACUUM processing is automatic and continuous at the Newark, N. J., plant of General Instrument Corp., since the company installed a Hayes Model VAC-50C vacuum, conveyor furnace. It is used for alloying diodes.

Loading and unloading are the only manual operations. Periodically, boats must be placed on an external conveyor which injects them into a vacuum lock inlet.

From the inlet, the work is belt conveyed through the heat zone where it undergoes processing temperatures up to 1832° F and is then returned to atmosphere through the vacuum lock outlet, where they are unloaded.

Set temperatures are maintained within ±1.8° F by proportional control instruments which govern three heat zones within the furnace. Control is by the three mode system: Rate, reset, proportional band. Control characteristics may be tuned by varying bias control and current limiting.

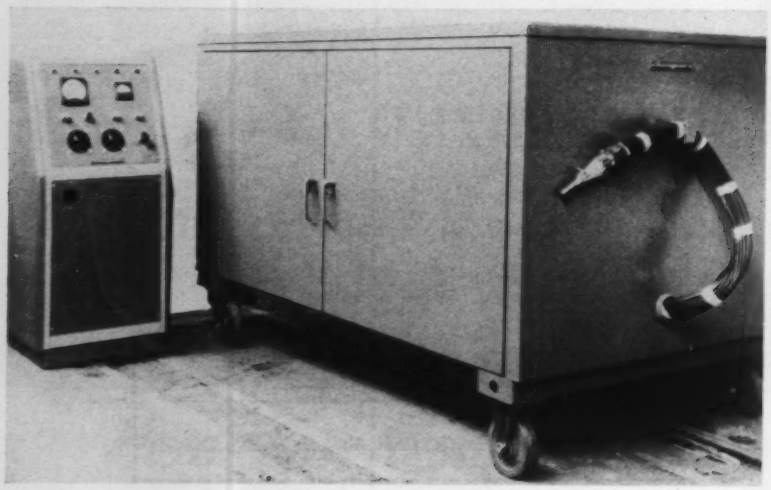
The company says close tolerance temperature control combines with split second timing of work conveyance to provide maximum yields of top quality diodes.

Performance shows that the furnace can attain pressures to 5 x 10^{-6}mm Hg and maintains operating pressures to 5 x 10^{-5}mm Hg under load, continuously and dependably.

The Model VAC-50C is processing 34 boats per hour with 250 to 300 diodes per boat.

For further information, *write* C. I. Hayes Inc., Wellington Ave., Cranston 10, R. I.

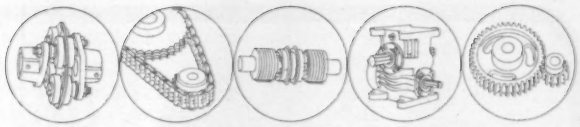
System Forms Metals Electrohydraulically



THREE major advantages are listed by Westinghouse for its electrohydraulic forming system: 1. Metals difficult to work conventionally can be successfully formed. 2. Shapes hard to make by ordinary methods can be produced. 3. Costs are kept low with easy to modify plastic or wooden dies.

Process: Energy from a capacitor bank is transmitted to a gap under water or other fluid in a tank containing a die and the metal to be formed. The pressure wave generated by the arc discharge across the gap causes the metal to assume the desired shape in the die.

The setup is packaged in two parts: A control console and a



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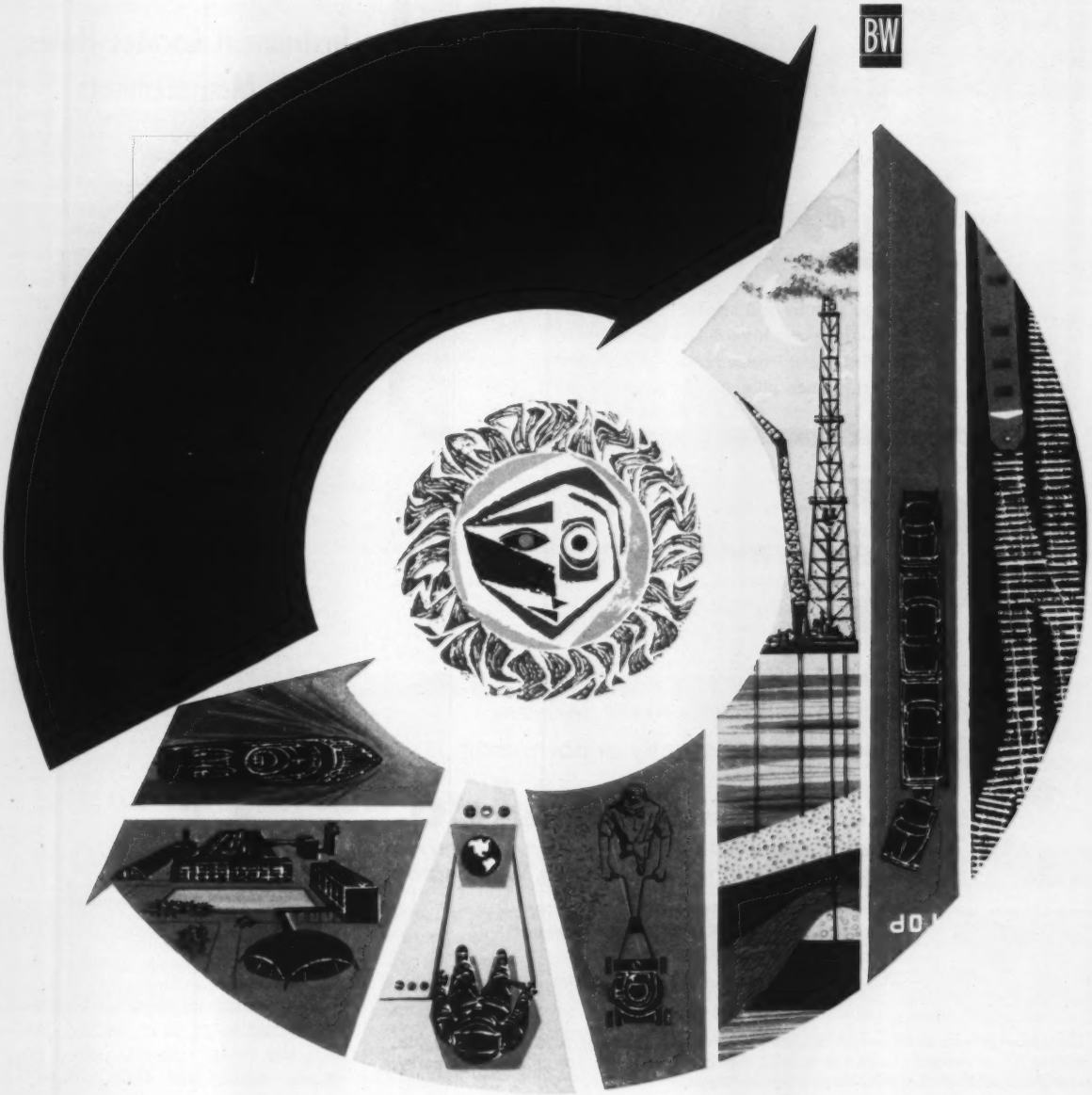

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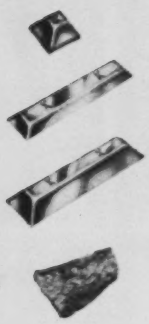

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separate modular power unit consisting of a dc power supply, capacitor bank, and switches. Additional modular power units can be added to the single control system to increase capacity, provide more reliability, or give longer life.

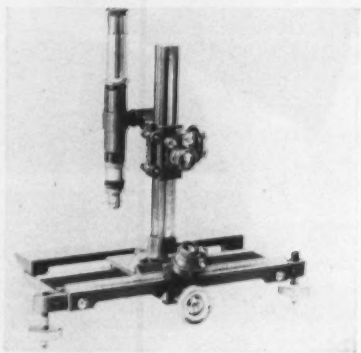
The system stores up to 42,500 joules at 20,000 volts, charges to full voltage in about 3 minutes, and discharges at a rate of 33 microseconds per cycle.

For further information, *write* Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

Instrument Locates Holes, Makes Measurements

A DUAL purpose comparator and co-ordinate cathetometer makes linear measurements in a horizontal or vertical plane. Measurements can be made on recessed and inaccessible points without physical contact with the part. Measurements are made by sighting through a 50X telescope-microscope onto calibrated scales reading directly to 0.0004 in.

As a cathetometer, the instrument can locate holes in inaccessible points in large and small castings, measuring the height of liquids in tubes, and measure deformation of materials under stress. It's also useful as an optical extensiometer for measuring dimensional changes due to thermal expansion, strain, and other forces.



By inserting an objective lens and tilting the scope to a vertical position, the device converts into a precision, micrometer slide compara-

tor for making linear measurements of horizontal objects.

Typical applications include uses in the shop or inspection department for measuring jigs, fixtures, dies, and other machined parts.

For further information, *write* National Instrument Co., Baltimore 15, Md.

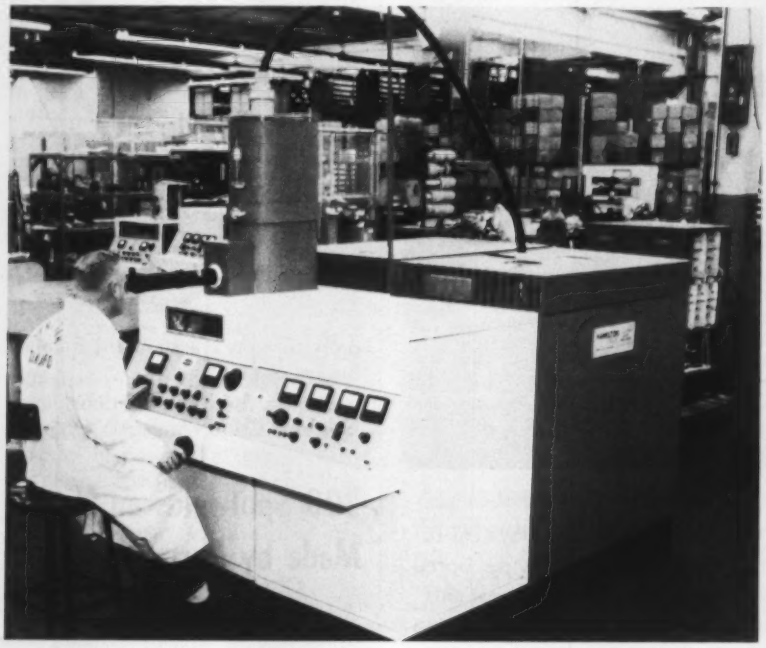
Zinc Rich Coating Protects Iron, Steel

GALVANIC protection is provided by a zinc rich coating called Devcon Z that dries to a metallic finish in about 30 minutes. The company says it can also be used as a primer for conventional or decorative coatings, and is effective over rust, provided loose scale has been removed.

Devcon adheres to galvanized surfaces. It's effective for reconditioning old galvanized surfaces or touching up new surfaces after welding.

Due to the coating's high metal content (95 per cent zinc) it has high resistance to abrasion and rupture. Because the material has high electrical conductivity, it's termed ideal for steel which is to be welded. One gallon weighs 27 lb and will protect about 1200 sq ft. No special mixing or other preparation is required.

For further information, *write* Devcon Corp., Danvers, Mass.

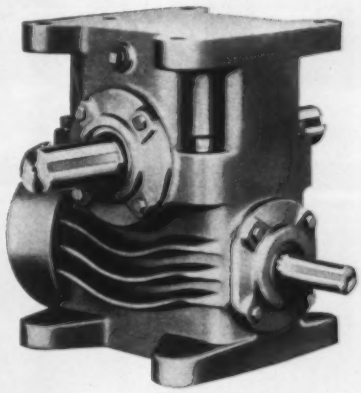


Electron Beam Welder Has Refinements

A BIGGER vacuum work chamber, more versatile work handling equipment, and simplified controls are featured on this electron beam welding machine. Designed by the Carl Zeiss Foundation, the unit is made by Hamilton Standard.

Typical applications include welding molybdenum, tungsten, titanium, ceramics, dissimilar metals, exotic steels, and aluminum. The company also says the unit can cut costs in fabricating standard machine parts. The Hamilton-Zeiss 3 kw unit uses 150,000 volts for electron acceleration. The electron optics system focuses to a spot size 0.0001 in. in diameter, achieving depth to width welding ratios as high as 20:1. Precise control en-

A Morse answer



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BW

Morse Chain Co., Dept. 2-111, Ithaca, N.Y. Export Sales: Borg-Warner International, Chicago 3, Ill. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ont.

New Strippit Quick-Change Holder with Micro-Set Gaging System for use on any 15-A, 10-AA or 10-A Strippit Fabricator, with jig bored Micro-Bars and Dial Indicators, allows gage settings to the nearest .001" in seconds. Guess work eliminated in close tolerance gaging—spring loaded Dial Indicators provide sensitivity and "feel" in settings. No need for special gages or jo-blocks. Use quick-reading built-in scales when close tolerance gage settings are not required.

This new system, now available on all new Strippit 15-A Fabricators, also quickly adapts to all existing 15-A, 10-AA and 10-A Fabricators. Let your Strippit Tool & Methods Engineer arrange to demonstrate this new Micro-Set Gaging System to you. Or write for Catalog MS.

WALES **STRIPPIT** INC.

210 Buell Road Akron, New York

In Canada: Strippit Tool & Machine Company, Brampton, Ontario; In Continental Europe: Raskin, S. A., Lausanne, Switzerland; In the British Isles: Kearney & Trecker—C.V.A. Ltd., Hove, Sussex England.

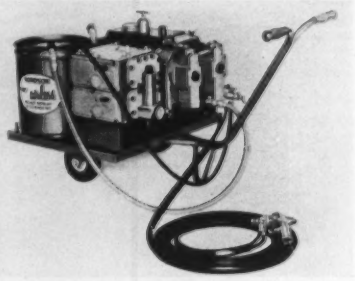
NEW PRODUCTS and equipment

ables the machine to be set for welding aluminum foil or stainless steel more than 1 in. thick. It was introduced at the National Metal Exposition in Detroit.

For further information, *write* Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.

Airless Paint Sprayer Easily Moved to Work

A DOLLY MOUNTED, hot spray painting unit (airless) has been developed by Nordson. The compact, mobile unit includes a Nordson AP pump together with two Nordson high pressure paint heaters and a filter. Provisions are made on the



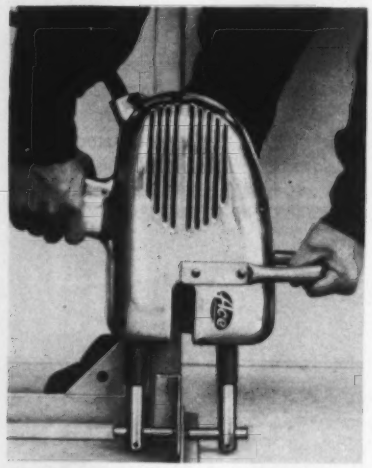
dolly to mount a standard 5 gallon bucket of paint.

For further information, *write* Nordson Corp., Amherst, Ohio.

300 Spotwelds an Hour Made by Portable Unit

A PORTABLE spotwelder has been introduced by Ace-Sycamore. The capacity is 3/16 in. for cold rolled steel and up to 1/8 in. combined thickness for stainless, galvanized, and cadmium plated steel. Sheets, rods, bars, and studs of many sizes and shapes can be handled. It can make 300 welds an hour.

If the portable feature is not desired, a tripod stand or roto-holder is available. Outstanding features: An electronic timer with adjustments from 1/60 second to a full second, 100 ampere contactor, independently suspended and completely insulated transformer, rugged construction that permits 1000 lb



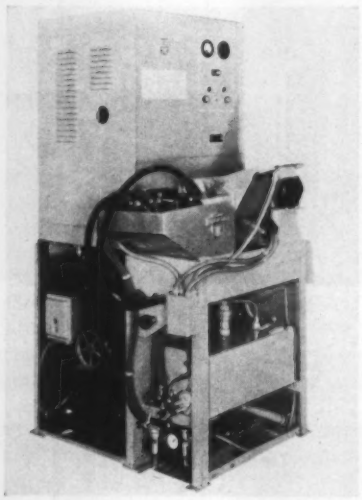
pressure at tips of electrodes, and up to 3 in. tip opening with a 7 in. throat depth.

The transformer is a heavy duty, twin type (air cooled) with a secondary rating of 2 volts and 8200 amperes, short circuit. Over-all size is 13 x 12 x 5 in. wide. Weight: 26 lb.

For further information, *write* Ace-Sycamore Inc., Sycamore, Ill.

Hardening Unit Can Be Adapted for Shaftwork

PARTS can be hardened at a rate of 600 an hour on a machine designed and built by Induction Heating for a vacuum cleaner manufacturer. The fixture can be easily adapted to handle an infinite variety of shafts, says the maker. Provision has been made to harden and draw a part in sequenced operations without any need for rehandling.

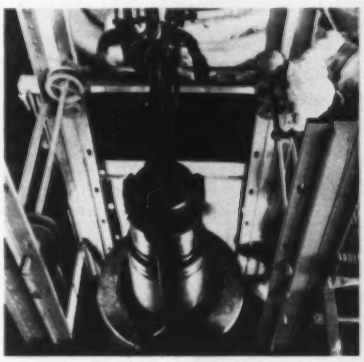


Draw cycles are accomplished with reduced power levels and with varying time intervals depending on the types of steel to be hardened and depth of case. Memory circuits automatically control all operations.

For further information, *write* Induction Heating Corp., 183 Wythe Ave., Brooklyn 11, New York, N. Y.

Cast Iron Sleeves Offered For Mill Backup Rolls

CAST IRON sleeves for backup rolls on temper mills are now available from Bethlehem Steel. Shrink mounted on cast or forged steel arbors, the sleeves combine the advantages of cast iron in temper mill service with the superior neck strength of steel rolls.



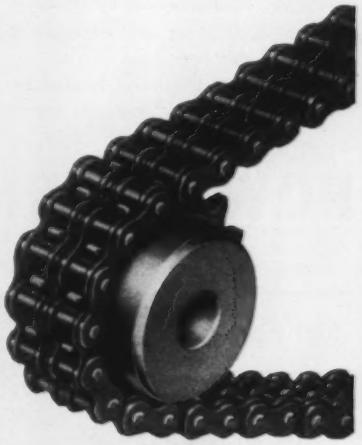
The sleeves were tested for six years on sheet and tin plate temper mills at Bethlehem's Sparrows Point, Md., plant. Records show that since introduction of the cast iron sleeves as much as 16,000 tons of sheet and 8000 tons of tin plate have been run through the temper mills between grinds of the backup rolls. Reports indicate sleeves have not split or slipped.

For further information, *write* Bethlehem Steel Co., Bethlehem, Pa.

Monel Powder Metallurgy Resists Corrosives

POWDER METALLURGY parts made from Gramix Grade 560 (Monel metal) resist corrosion by

A Morse answer



roller chain

...when the problem involves service life and performance

Superior fatigue resistance

Increased horsepower ratings

Statistical hardness control

Electronically controlled pitch

All parts automatically inspected

Drive-design service

Distributor-stocked

Got a chain problem? Call your Morse distributor. He's listed in the Yellow Pages.

MORSE

A BORG WARNER INDUSTRY

BW

Morse Chain Co., Dept. 2-111, Ithaca, N.Y. Export Sales: Borg-Warner International, Chicago 3, Ill. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ont.

most chemicals. Major exceptions are strong acids and sulfurous gases. Tensile strengths of test bars average 30,000 psi at a density of 7.2 grams per cubic centimeter.

Hardness of Gramix Monel parts ranges between 50 and 60 on the 15T scale. Radial crushing strength averages 55,000 psi and elongation is about 5 per cent.

Because the material is ductile, both elongation and hardness values vary, depending on the type of processing parts undergo. Useful operating range goes up to 1000° F. Extended humidity tests with rings of the material have produced no evidence of corrosion or staining. The manufacturer says the material is also suitable for use with Graphitar (carbon-graphite) either as mating parts or as the metallic backup.

For further information, *write* United States Graphite Co., a division of Wickes Corp., Saginaw, Mich.

Metal Shears Improved

THE Edwards No. 20 shear has been redesigned to permit cutting of cable up to 1½ in. in diameter. It will also cut 1⅜ in. round stock, 1¼ in. square reinforcing bars, 3 x 3¾

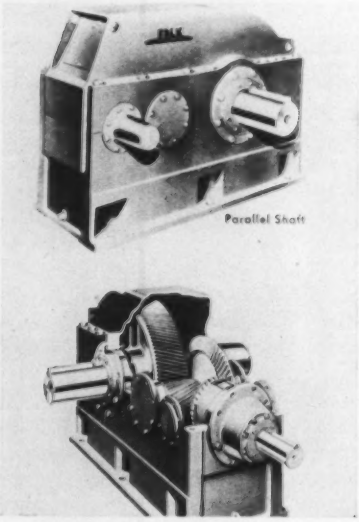
in. flat iron, and 2½ x 5/16 in. angle iron. The cable cutting knives for the No. 20 will fit previous models.

For further information, *write* Edwards Mfg. Co., Albert Lea, Minn.

Speed Reducer Lines Available in 22 Sizes

PRODUCTION of two series of horizontal speed reducers is announced by Falk: Parallel shaft (Type Y) with ratios 1.84 through 292 to 1 and right angle (Type YB) with ratios 5.06 through 1207 to 1.

Capacity ranges from 9000 to 1,570,000 lb-in. of torque in catalogued, standard units (higher in custom units) with 22 standard sizes for each type.



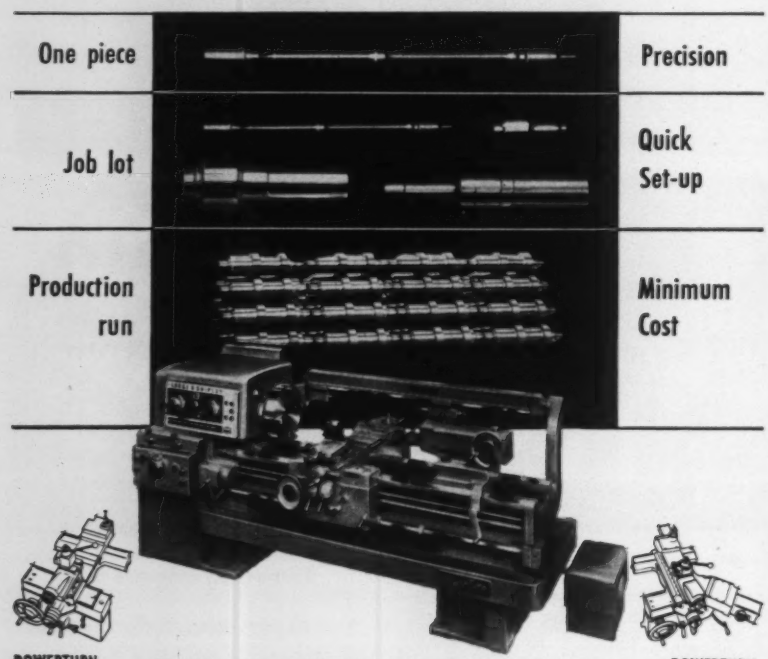
POWERTURN COPYMATIC

...quick-change artist!

One piece — Precision

Job lot — Quick Set-up

Production run — Minimum Cost



POWERTURN 90° COPYMATIC CARRIAGE

POWERTURN 45° COPYMATIC CARRIAGE

You've got a good thing going for you when you install a POWERTURN COPYMATIC. Choose engine lathe operation or instantly change over to tracer controlled duplication. Lodge & Shipley offers you a choice of 45° or 90° hydraulic tracing slides. No awkward projections, built for efficiency and operator convenience.

Whatever your choice, Lodge & Shipley has both. Write for literature describing each type of POWERTURN COPYMATIC... fine lathes with records such as: "saving $14,000 per year"... "production increased 300%"... "saves 85% of former time."

The Lodge & Shipley Co.,
3070 Colerain Ave., Cincinnati 25, Ohio.

your Lodge-ical choice in lathes...

Lodge & Shipley

Gears are precision cut, single helical types with extra depth, high pressure, angle tooth form for greater capacity and increased strength. Heavy duty, double ended shafts can be turned 180 degrees for double gear life, and have large diameters to accommodate maximum torque and overhung loads. Strong housings have smooth flat surfaces for simple mounting of motor brackets, backstops, brakes, and other modifications.

For further information, *write* Falk Corp., Box 492, Milwaukee 1, Wis.

One Component Adhesives Make High Strength Bonds

YOU CAN bond metal and plastic parts with paste type, Scotch-Weld brand adhesives EC-2086 and EC-2186. High strength properties are reported at service temperatures from −70° F to +200° F.

A late hardener eliminates the need for accurately weighing and mixing a hardener with the base resin at time of use. Heat curing is necessary for hardening.

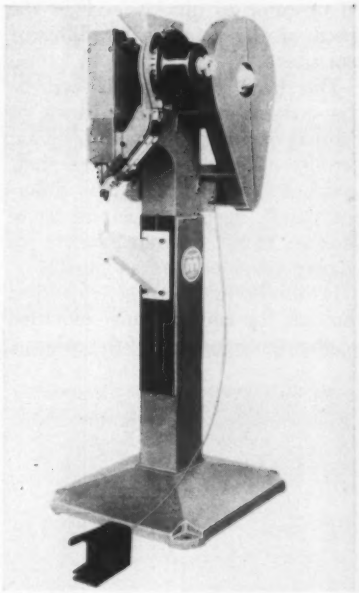
The adhesives may be applied by knife coating, by trowel, or by high pressure injection. For optimum results, a cure temperature of 350° F is recommended. Cure temperatures up to 450° F can be used with a corresponding reduction in cure time.

For further information, *write* Adhesives Coatings & Sealers Div., Minnesota Mining & Mfg. Co., 900 Bush Ave., St. Paul 6, Minn.

Unit Sets 3/16 x 1 in. Semitubular Rivets

A SINGLE spindle, rivet setting machine, Milford's Model 310, handles semitubular rivets up to 3/16 in. in diameter and 1 in. long in heavy duty, long run production.

A flexible cable has been provided with the standard, mechanical clutch, trip switch so that the operator can conveniently locate the foot trip. The rotary hopper is fitted with a handwheel so that the barrel can be quickly pulled for easy changeover to another rivet length.



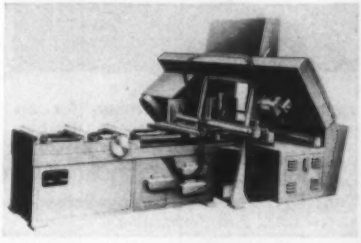
Specifications: Throat depth of 12 in., anvil height averaging 42 in., 10 in. diameter hopper, 72 in. over-all height, single revolution roller clutch, crank driven toggle setting mechanism, 165 rpm flywheel speed, V-belt drive, and a motor rated at 1/3 hp, 1140 rpm, single phase, 60 cycles, 110 volts ac. Extra raceways can be quickly interchanged by removing four bolts.

For further information, *write* Milford Rivet & Machine Co., Milford, Conn., or Norwalk, Calif.

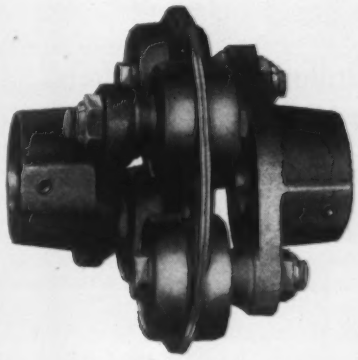
Feed, Cutting Unit Integrated on Bandsaws

COMPLETE integration of material feed and cutting unit is featured on two, automatic, hydraulic bandsaws. Both have the W. F. Wells BF-24 automatic bar feed unit. The combination is suitable for production cutting with high speed or carbon steel blades, says the company.

The BF-24 bar feed will cut an entire bar without resetting, leaving only a short piece in the workhold-



A Morse answer



Morflex couplings

...when the problem involves vibration and misalignment

Isolate vibration

Cushion shock

Absorb misalignment

Torsionally flexible

Impervious to water, dirt, oil

Arrest electrolysis

Distributor-stocked

Got a coupling problem? Call your Morse distributor. He's listed in the Yellow Pages.

MORSE

A BORG-WARNER INDUSTRY

BW

Morse Chain Co., Dept. 2-111, Ithaca, N.Y. Export Sales: Borg-Warner International, Chicago 3, Ill. In Canada: Morse Chain of Canada, Ltd., Simcoe, Ont.

ing vise. Setup time has been virtually eliminated, says the manufacturer. The BF-24 will easily handle bars up to 14 x 16 in. It has a load rating of 9000 lb. Maximum feed stroke is 24 in.

For further information, *write* W. F. Wells & Sons Inc., Three Rivers, Mich.

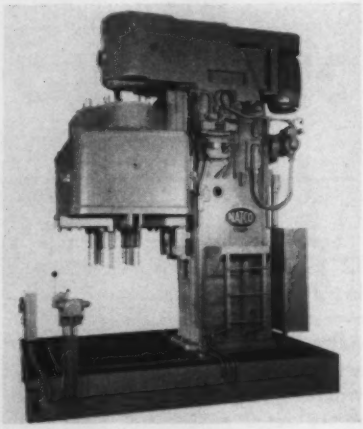
Drilling, Tapping Units Rated from 5 to 30 hp

A LINE of drilling and tapping machines (vertical, adjustable, multispindle types) is available from Natco. The units are built in sizes ranging from 5 to 30 hp with thrust capacities from 8000 to 25,000 lb. Many head sizes and spindles are available. The machines conform to JIC and building block standards.

The heads are designed for independent change of spindle speeds with two speeds and neutral for each spindle. The feature permits an operator to quickly change the speed of the spindles for different tool sizes.

The head drive speeds can be changed by an electrical clutch or manual shifting mechanism. That permits a high or low drive shaft speed, making possible four different spindle speeds with each set of change gears. A wide variety of change gears can be supplied.

Hydraulic feed control is handled through the control panel mounted on the righthand side of the column.



Feed rates are infinitely variable over a range of 1 to 30 in. per minute and rapid traverse rates up to 275 in. per minute are possible. The hydraulic fluid is metered through feed aperatures designed for fine adjustment. Pressure and temperature compensating elements assure uniform feeds.

For further information, *write* National Automatic Tool Co. Inc., Richmond, Ind.

Portable Tool Attachment Precisely Swages Sleeves

A PORTABLE tool made by Cherry Rivet presets sleeves for flareless couplings on seamless tubing. Called the Sleevset tool, the lightweight accessory is attached to a G-87B Lockbolt gun for use on stainless and mild steel tubing.

The tool can be taken to the work for precise, predetermined, sleeve swaging. Weight: Under 12 lb.

For further information, *write* Cherry Rivet Div., Townsend Co., Box 2157-Z, Santa Ana, Calif.

Tilting 700-tons of steel furnace

CONE-DRIVE GEARS

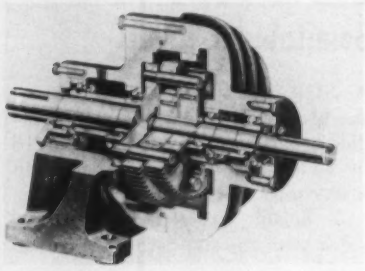
DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

Here's a closeup of tilting mechanism for an electric furnace. Standard, stock model, double-reduction Cone-Drive **double-enveloping worm** gear speed reducer tilts furnace and heat with combined weight of 700 tons.

Powerful Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

Size, Weight Reductions Stressed in Drive Unit

DESIGN modifications of the Hi-Range Cycloidal reduction drive gives standard ratios from 15:1 up through 17:1 in a single stage of reduction. The manufacturer says the units require 40 to 60 per cent less volume and weight than other types of reducers of comparable ratings. Input and output shafts are on the same axis.



The drives are available in a wide range of torque ratings from 160 through 6000 in.-lb.

For further information, *write* Black Tool Inc., 1924 S. Navajo St., Denver 23, Colo.

Another example of PPG research leadership . . .

Now, sturdy galvanized steel building panels can have the glamour of SMART, MODERN COLORS!

Pittsburgh DURACRON® Thermo-Setting Acrylic Enamel gives galvanized steel a beautiful, long-lasting finish with many outstanding advantages!

• **This great PPG development** transforms galvanized steel into one of the most colorful and attractive building materials of all. It opens up many new uses for galvanized steel in buildings where *color* is important and the emphasis is on advanced styling, beauty, modern appearance.

Here are important facts about DURACRON:

1. Outstanding color retention! DURACRON comes in a wide range of colors, and KEEPS its lustrous color under the most severe weather conditions.

2. Easy to apply! DURACRON can be sprayed, roll- or curtain-coated. High solids content yields desired film thickness, hides uniformly. These advantages permit quality production at a high rate of speed.

3. Adhesion qualities are remarkable! In the baking process, DURACRON fuses to galvanized steel like part of the metal itself. It has a "staying-on" ability never before achieved for galvanized steel in 1- or 2-coat applications.

4. Amazing toughness and durability! DURACRON minimizes marring, scratching and every conceivable type of damage that might happen in fabrication, shipping and erection.

5. Universal finish! Can be sprayed on pre-formed accessories or roll coated on post-formed building panels with uniformity in appearance, color retention and weatherability.

• **For full particulars,** write, wire or phone PITTSBURGH Plate Glass Company, Industrial Finishes, 1 Gateway Center, Pittsburgh 22, Pa.

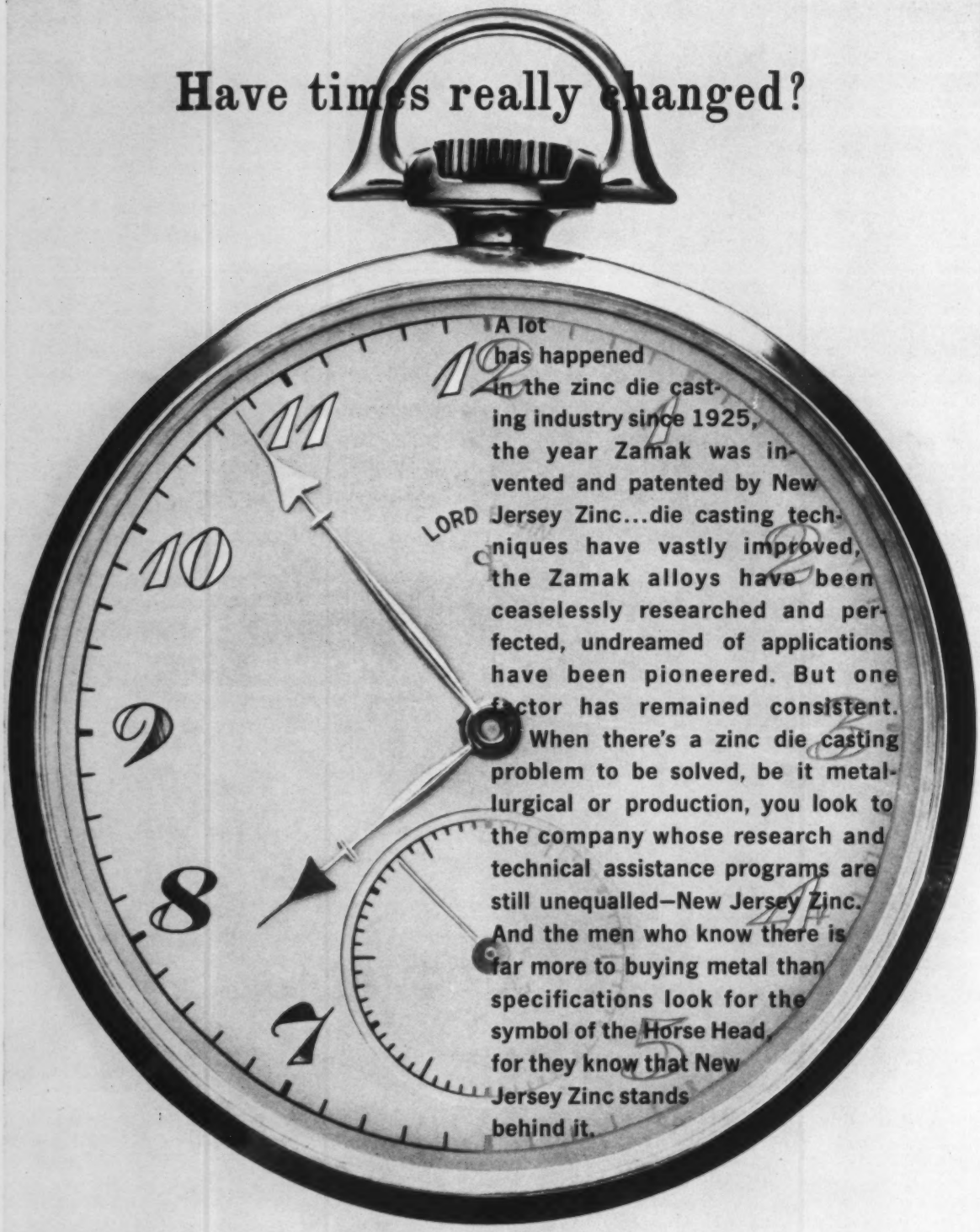
PPG®

PITTSBURGH INDUSTRIAL FINISHES

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS • FIBER GLASS

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

Have times really changed?



A lot has happened in the zinc die casting industry since 1925, the year Zamak was invented and patented by New Jersey Zinc...die casting techniques have vastly improved, the Zamak alloys have been ceaselessly researched and perfected, undreamed of applications have been pioneered. But one factor has remained consistent. When there's a zinc die casting problem to be solved, be it metallurgical or production, you look to the company whose research and technical assistance programs are still unequalled—New Jersey Zinc. And the men who know there is far more to buying metal than specifications look for the symbol of the Horse Head, for they know that New Jersey Zinc stands behind it.

NJZ

HORSE HEAD PRODUCTS

THE NEW JERSEY ZINC CO.

160 FRONT STREET • NEW YORK 38, N. Y.

NEW literature

Write directly to the company for a copy

Stainless Condenser Tubing

Stainless Steel Condenser Tubing Applications, a 12 page booklet, gives information on the use of stainless tubing in condensers, including historical background, performance data, applications in various types of water, fabrication of tubes, and other information. Advertising Dept., Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh 22, Pa.

Armco 17-4 PH Stainless

A handy wall chart is offered to heat treaters and other subcontractors working with Armco 17-4 PH stainless. Six specific heat treatments are covered. The effect on tensile and ultimate strength, Rockwell hardness levels, and 0.02 per cent elongation are listed. Ask for P. O. 3861. Product Information Service, Armco Steel Corp., Middletown, Ohio.

Reinforced Plastics

Reinforced plastics production methods are described in a 16 page booklet, *Guide and Data for Engineers and Purchasing Agents*. Included: Hand layup, sprayup, preforms in matched metal molds, premix, prepregs, and filament winding. Reinforced Plastics Division, Society of the Plastics Industry Inc., 250 Park Ave., New York 17, N. Y.

Equipment Leasing Study

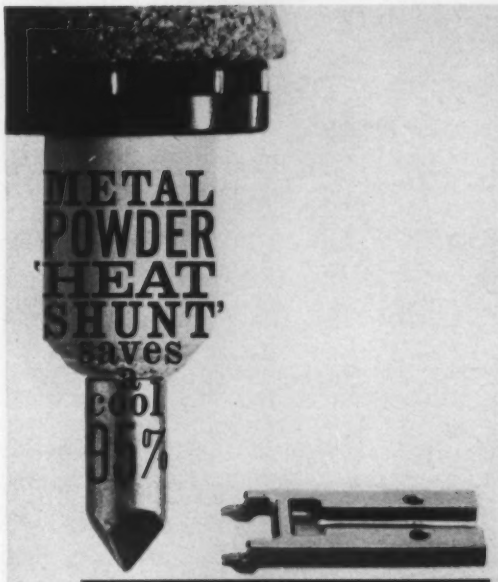
A fifth edition of *Pros and Cons of Leasing* has been revised and expanded to 24 pages. A new section advises on renewals and options to buy at the end of the lease period. Also examined are the latest Internal Revenue Service rulings with regard to writeoffs of payments on leased equipment. Advantages and disadvantages of leasing equipment are analyzed in several situations. Included in the study are tables and charts analyzing costs of leasing compared with other operating agreements. Foundation for Management Research, 121 W. Adams St., Chicago 3, Ill.

Aluminum Protected Steel

The Alonizing process of diffusing aluminum into steel to form an iron-aluminum, protective alloy with mechanical properties provided by the base material, is described in a brochure. Industrial applications are explained. Alon Processing Inc., P. O. Box 11431, Pittsburgh 38, Pa.

Investment Castings

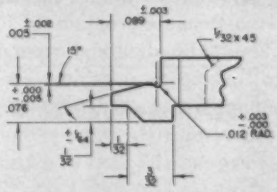
Quick Facts, a handy pocket folder, lists the major advantages of the lost wax process for producing machine parts from almost any alloy or metal. Included are tables for determining general tolerances, flatness, straightness, concentricity, roundness, accuracy of angles, hole positioning, keys and keyways, parallel sections, wall thicknesses, and surface finish values. Hitchiner Mfg. Co. Inc., Milford, N. H.



The heat shunt shown above is pressed from pre-alloyed bronze powder and hard-chrome plated. It is used to position electronic components on printed circuit boards and eliminate heat damage when soldering.

Design teamwork between Kwikset Powdered Metal Products and Autonetics Division of North American Aviation has resulted in a part which is produced at a 95% cost saving over previous machining methods.

The heat shunt is easily produced in four precise end modifications to locate components at various angles. When soldering,



the high heat conductivity of the bronze protects the components and circuit from melting by drawing off heat produced at the solder joint. The heat shunt itself is solderproof thanks to its hard-chrome plate.

This time-saving printed circuit tool demonstrates that, working together, the metal powder fabricator and his customer can lick the hottest problem. To find out how to put nonferrous powder metallurgy to work for you, write today to the New Jersey Zinc Company, producers of nonferrous metal powders setting tomorrow's standards today.

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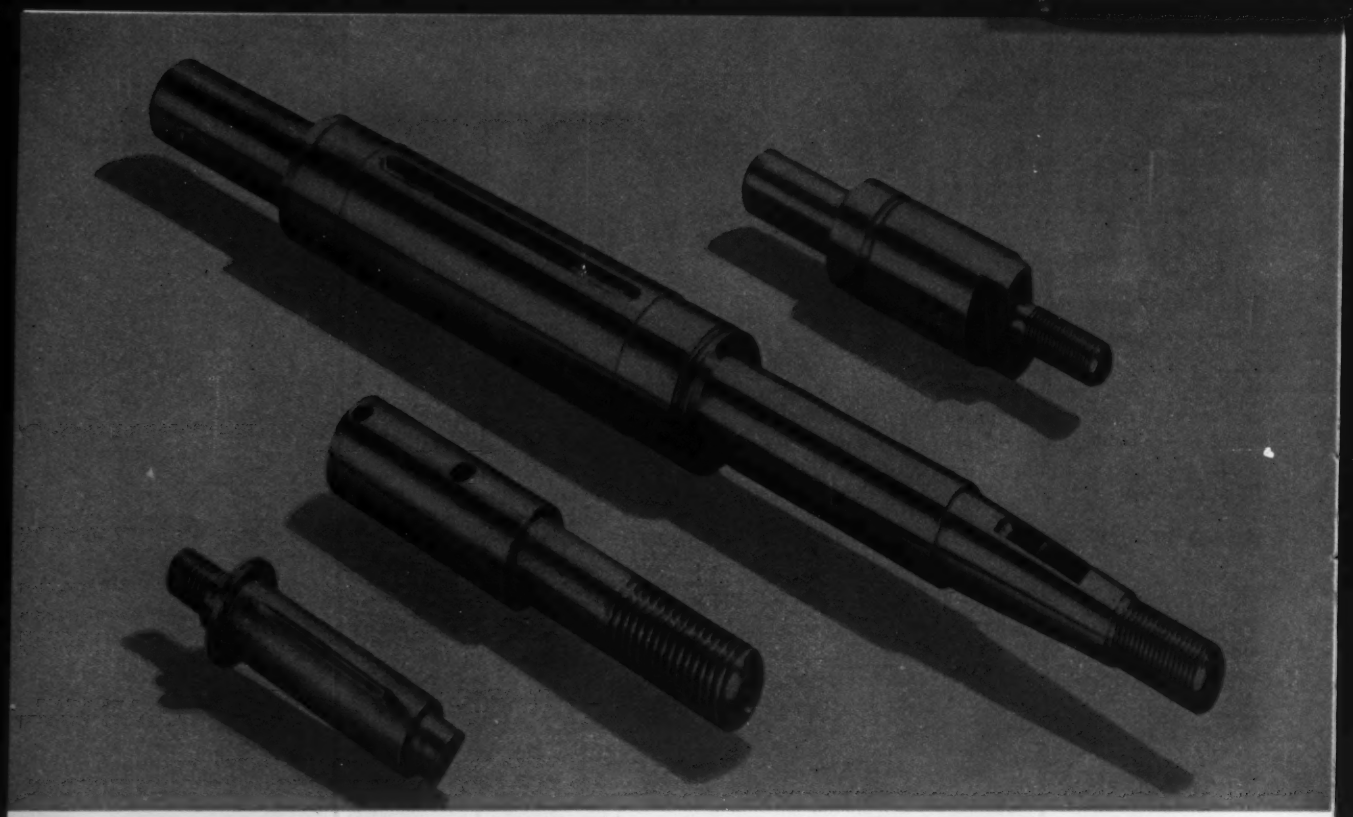

Maintenance Department

Cuts cost of 70 different repair parts up to 65% with Stressproof® steel bars

STRESSPROOF steel bars are used almost exclusively in a large textile producer's maintenance program for 1200 looms and spinning frames. Several hundred high-strength repair parts a year are needed to keep the machines running 24-hours every day with minimum down time. All parts are made of STRESSPROOF in the company's own maintenance shop—sometimes with a "run" of 100 parts of a kind.

The company's maintenance supervisor selected STRESSPROOF strictly by elimination. He reports the following advantages.

He can machine faster with STRESSPROOF. He gets a better finish after machining. STRESSPROOF gives him stronger, harder parts. Parts made of STRESSPROOF wear longer . . . break less often in service. He doesn't have to bother with heat treating and its accompanying costs such as cleaning, straightening, secondary machining, and extra handling.

In short, it actually costs less to make his own parts from STRESSPROOF than to buy factory replacement parts . . . and he says he gets better parts.

Look at these typical savings:

Part: Four-threaded worm		Part: 1⅞" x 65" Spinning journal	
Factory replacement cost	$11.45	Factory replacement cost	$22.00
Total cost using STRESSPROOF	3.50	Total cost using STRESSPROOF	17.00
Savings per piece	$ 7.95	Savings per piece	$ 5.00

Stressproof is available from your steel service center

What do machine repair parts cost you? . . . Mail this coupon and prove to yourself that STRESSPROOF can save you money . . .

☐ Please send me your free booklet "How to make your own machine and repair parts quicker and easier."

La Salle STEEL CO. | 1414 150th Street Hammond, Indiana

name _____ title _____

company _____

address _____

city and zone _____ state _____

Mills Note Pickup in Orders

STEELMAKERS may put more new tonnage on their order books in November than in any previous month this year.

Sales are running about 5 per cent ahead of October's despite downtrends in demand for construction steel, pipe, and tin plate. The seasonal losses for those products are being fully offset by increased demand for sheets and wide plates. Automakers and smaller users in almost all steel consuming industries are stepping up their buying. They need bigger inventories to support rising production schedules and to protect themselves against being caught short when deliveries start lengthening.

MILLS PREPARE FOR BOOM— One reason some steelmakers are booking so much tonnage is that they've encouraged their divisions to place first quarter orders now. By Mar. 1, one company's subsidiaries will be making no demands on its mills—freeing them to accept big orders from outside customers who will be building inventories in preparation for a possible strike next summer.

AUTOMAKERS ACCELERATE— In Chicago, automakers are asking their steel suppliers to ship some orders ahead of schedule. Although the tonnages involved aren't great, the requests are nonetheless heartening. They show that inventories accumulated by the auto companies during the strikes are dwindling and that bigger steel orders are on the way. Look for automakers to buy 10 to 15 per cent more steel next month than they'll take in November. The near record rate of new model sales is forcing them to work overtime in 22 of their 47 assembly plants.

STRONG FIRST QUARTER— In January, the auto companies are going to start building their steel inventories in earnest. They've told some steelmakers that their first quarter purchases will be 15 to 20 per cent higher than those in the fourth quarter. Much of the increased tonnage will have to go into storage because first quarter auto production isn't likely to be much higher than the 1.8 million cars forecast for the October-December period.

RECORD YEAR FOR AUTOS?— Sales of the automobile and automotive part industry will be record breaking in 1962, predicts Prof. Daniel Suits, University of Michigan economist (see Page 79). He believes more than 7 million passenger cars will be sold. If he's right, dollar volume will be higher than it was in 1955 (the record year for autos), but steel consumption will be lower. Reasons: 1. Almost all the cars sold in 1955 were made in the U. S. Next year, probably 400,000 will be imports. 2. About 35 per cent of next year's domestic output will be compacts. They use 25 per cent less steel than standard autos. 3. The changeover to unitized bodies is reducing steel consumption in some instances. Example: The 1962 Plymouth Savoy V-8 sedan (standard —not a compact) uses 428 lb less steel than its 1961 counterpart.

PRODUCTION STEADY— Look for ingot production in the week ending Nov. 25 to be about the same as the 2,044,000 tons that STEEL estimates the industry poured in the week ended Nov. 18. Output then was off 0.1 per cent from the previous week's. Average over the last six weeks has been about 2,050,000 tons. Only moderate improvement is expected before yearend.

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*Current prices were published in the Nov. 13 issue and will appear in subsequent issues.

New strippable plastic film for protection of stainless steel surfaces

Protects your product quality during handling and fabrication while offering these eight distinct advantages:

- 20% cheaper than adhesive paper
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You get greater protection *plus* economy with the new in-fab plastic coating now being applied to MicroRold® stainless steel sheet, cut strip, and coiled sheet and strip. The semi-transparent protective film is 20% lower in cost than regular adhesive paper and offers more versatility in fabrication. The protective film is applied at our mill on customer order only, and is available on stainless steel in gages from .018″ to .050″ in widths up to 42″. It is guaranteed to strip off in one piece by loosening with fingernail at any corner.

Strippable plastic protection is intended as a safeguard only during ordinary handling, storage and fabrication—*not* as a barrier for weather, water damage, undue abrasion, impact or foreign substance. Once removed it will not adhere again.

Want more information or a test sample? Write to Product Development Dept., Washington Steel Corporation, 11-O Woodland Ave., Washington, Pa.

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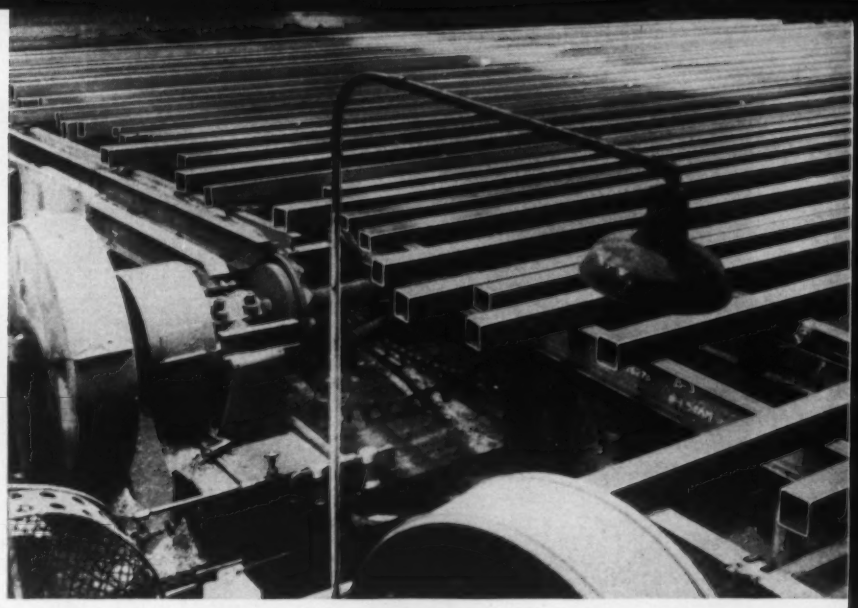
Woodland Avenue
Washington, Pa.

Structural Tubing Begins To Move



Source: U. S. Steel Corp.

"TWELVE schools going up right now are using our hot rolled structural tubing—and that's just the beginning. Wait until we get our story across to architects and designers."

That's what Walter P. Rhodes, general manager of marketing for U. S. Steel Corp.'s National Tube Div., Pittsburgh, tells STEEL.

He sees a bright future for the product his company introduced in June.

"Our No. 1 job is to show architects that using square and rectangular tubing makes as much sense economically as it does aesthetically," he continues. "Hot rolled, structural tubing costs 25 to 30 per cent less per pound than the products it's replacing—specialty tubing or fabricated box sections —and no more than conventional structurals."

To get that message across, National Tube is conducting a national advertising and direct mail campaign aimed at 50,000 architects and designers. It's offering prospective customers help in marketing, design, and application through the consulting services of its market development, research, and engineering staffs.

• **Marketing Objectives**—Objectives are threefold—to increase sales, penetrate new markets, and recapture from concrete, wood, and aluminum industries some of the business that they've taken from steel. (Aluminum producers also make square and rectangular tubing for structural use.) Although structural tubing competes with products of other divisions of U. S. Steel Corp. — notably concrete, and to some extent, conventional structurals—corporate executives regard it as a supplement to the structural line. It's not intended to replace the wide flange section as a column, but it will be used when designers have more requirements to meet than merely supporting a load.

The big selling point for structural tubing is its high strength-to-weight ratio. When the weight saving factors are properly utilized, says National Tube, a building erected with tubing will be just as strong as a like structure employing conventional steel members, but 30 to 40 per cent lighter. Lighter framework can mean lighter footings and foundations. It can also mean reduced construction costs, lower freight charges, lower handling costs, and easier and faster end use.

Case in point: A 55 classroom school to be completed this year in Elmira, N. Y., will require 166 tons of structural tubing in 5 in. square columns. Cost of building is $2 to $3 per square foot under the New York state average for school construction and $174,000 less than the budgeted amount—despite an increase of 7962 sq ft in building area. Use of the structurals in a light frame, modular system contributed significantly to the cost reduction.

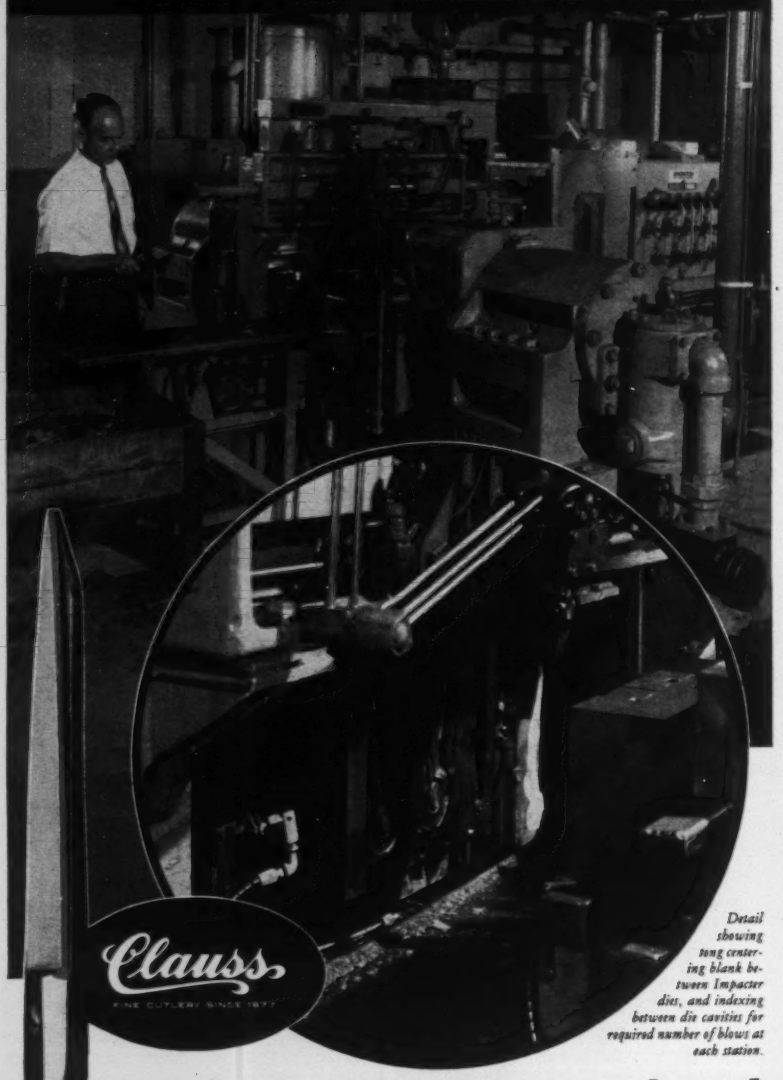
• **Construction Beckons** — Because of the trend toward curtain wall construction and modular building, National Tube believes its structurals will be used extensively in columns, posts, or spandrel beams and in complete load bearing panels, window walls, and entrance structures. Tubular load bearing columns permit thinner walls and save rentable floor space—a matter of great importance to owners of commercial buildings. What's more, they can be exposed. There's no need for the boxing or plastering usually required for conventional structurals.

Although the building industry is the prime target for structural tubing, producers are also setting their sights on other markets. They see good prospects for the product in:

• Heavy machinery — to reduce weight and resist torsion.

• Transportation — for automotive torque tubes and housings for axles and shafts; as support members in

"The Model 'C' Impacter achieves new peaks of production speed and efficiency for Clauss"



Detail showing tong centering blank between Impacter dies, and indexing between die cavities for required number of blows at each station.

Clauss
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Scissor forgings produced automatically on the Impacter ..faster, better, more uniform

Clauss Cutlery Company, of Fremont, Ohio, famous manufacturer of scissors, shears and snips, is achieving remarkable results with the Cecomatic Forging Process, incorporating the Model "C" Impacter.

Better quality forgings are produced faster, with reduced scrap, and less stock required.

Dies last longer, scaling is reduced and parts dimensions vary less, greatly reducing mismatch of mating parts, according to R. W. Van Hook, Vice President, Clauss Cutlery Co.

Write for details and a copy of Bulletin 110-L-1, "Cecomatic Process for the Jobbing Type Production of Drop Forgings."

CHAMBERSBURG ENGINEERING COMPANY • CHAMBERSBURG, PA.

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THE FRANKLIN INSTITUTE'S 1961 LONGSTRETH MEDAL "FOR INVENTIONS OF HIGH ORDER" WAS AWARDED THE DESIGNERS OF THE IMPACTER

auto frames, truck bodies, railroad cars, and ships.

- Construction and farm equipment —as structural members and supporting columns.
- Road building—as structurals for highway bridges and signs.
- Defense—in support frames for radar and gantry towers.

Before National Tube introduced its new product, builders who wanted square of rectangular structural steel members had only three choices —electricweld tubing, cold drawn seamless tubing, or box sections fabricated from channels or beams and plates. The tubing cost more than conventional structurals and was available in limited sizes. It was made to pipe specifications. Squares and rectangles were cold formed on turk's-head rolls or draw benches.

• **Why It's New**—National Tube's product is new because: 1. It's hot rolled from seamless rounds or welded on regular pipe mill production equipment at high speeds. 2. It's produced to structural specifications in carbon structural grades, ASTM A7 and ASTM A36. Production points are U. S. Steel's Fairless Works at Fairless Hills, Pa. (where perimeters 14 in. and under are hot rolled by the continuous weld method) and National Tube's National Works, McKeesport, Pa. (where perimeters over 14 in. to 40 in. are hot rolled by the seamless process). Squares are available in sizes from 1 to 10 in. Rectangles can be obtained in sizes from 2 by 3 in. up to 6 by 10 in. Both are stocked in random lengths from 36 to 42 ft. They can also be ordered in cut lengths or multiples. The minimum mill order is 40,000 lb.

• **Competitors Undaunted** — Producers of cold formed tubing queried by STEEL say National Tube's entry into the structural business with a rolled product should do them more good than harm. They reason that the company's heavy promotional efforts will expand the market. Some of the electricweld people claim that their prices are in line with National Tube's and that they can hold closer tolerances and provide better corner radiuses.

Although National Tube has the hot rolled business to itself at the

moment, other integrated steelmakers say they could enter the field without much trouble. They're waiting to see what kind of market develops. A possible deterrent: They would be going into competition with some of their customers—people who buy sheets or plates and convert them to structural tubing by welding and cold forming.

Tin Plate . . .

Tin Plate Prices, Page 136

Producers of tin plate report the market is in the doldrums. They're getting few new relases from the canmakers. Inventories are substantial, and production will be off this month and next. One Chicago area maker plans to shut down tin mill facilities for two weeks late this month. Similar action may be taken by other producers.

In light of the sharp drop in tin plate production this quarter, it's almost a certainty that the year's shipments will not establish a record, even though the nine month total was record breaking.

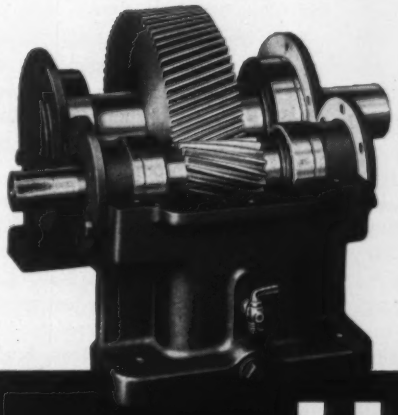
Sheets, Strip . . .

Sheet & Strip Prices, Pages 135 & 136

Hot and cold rolled sheet bookings are picking up a little, reflecting slightly more active demand on automotive account and at least fairly sustained buying in other consuming areas. Some mill executives say there is more buying of sheets for inventory than is the case in other major steel products.

Mill delivery promises still range two to three weeks on hot rolled and two to five weeks on cold rolled. Shipments of galvanized sheets are available by mid-December, reflecting some seasonal easing in requirements. Electrical sheets can be had for delivery by mid-December to early January, depending upon grade. Enameling stock can be placed for mid-December shipment.

A pickup in defense requirements is noted at some points. So far, the mills see few signs that consumers are expanding their inventories, but there's more talk of plans to bolster stocks. Its expected that galvanized sheet production will hold close to capacity through December. You hear this speculation: Some makers may find it necessary



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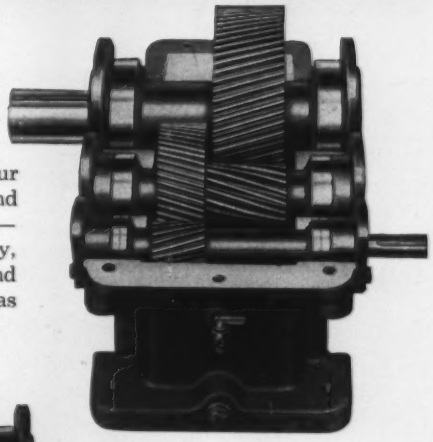

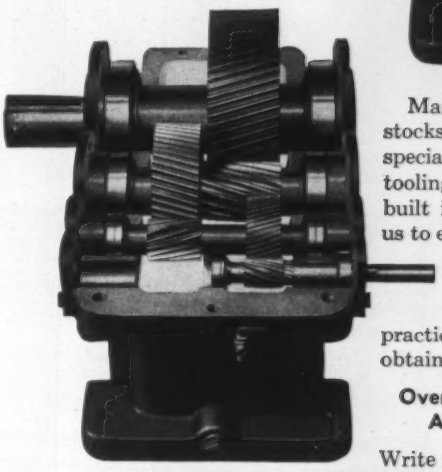

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to ration tonnage after the first of the year as consumers rush to build stocks in anticipation of a midyear steel strike.

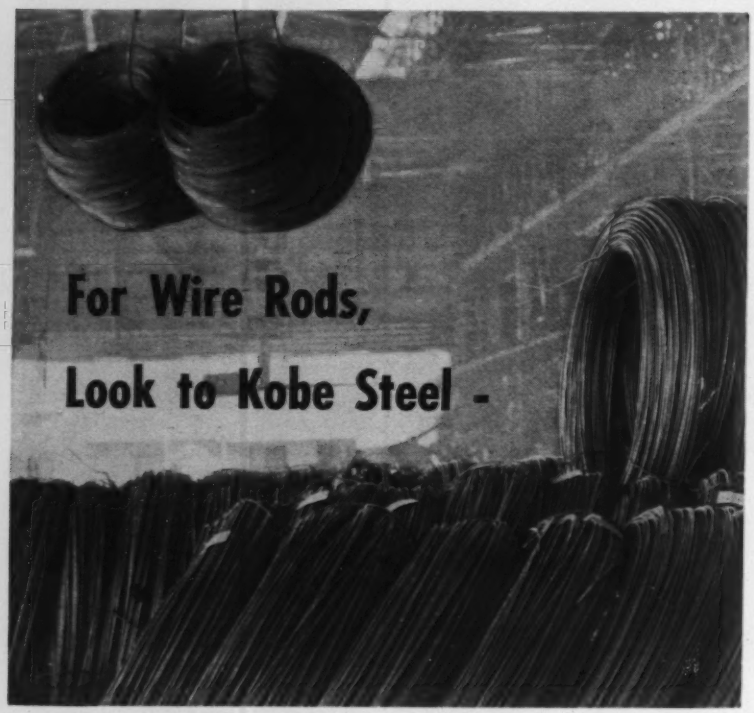
Steel Bars . . .

Bar Prices, Page 134

Some improvement in automotive requirements is reflected in steel bar demand. Generally, the market is sluggish, with trading continuing spotty. Not much buying for inventory is reported with deliveries available on short notice.

Mill delivery promises remain around two to four weeks on hot bars and ten days to two weeks on cold drawn carbon bars. Shipments of hot and cold alloy bars are relatively prompt.

Defense work is providing growing demand for bar stock. Steel buying is heavier for small arms production, notably in New England. Alloy orders are accounting for the bulk of the increase. The arsenal at Springfield, Mass., is closing on 500 tons of round cornered squares, Grade 8620H. It's also taking bids on two contracts for forging quality stainless, mostly grade 416, 1 in. in diameter.



With 35 years of experience in the production of low carbon steel wire rods, and a proud record of being the first to produce high carbon steel wire rods in Japan over 30 years ago.

Kobe Steel, with the complesion of its new No. 5 mill in June of 1961, now has production capacity of 740,000 tons annually and is known as the oldest, largest and most versatile manufacturer of steel wire rods in the Far East.

Particularly famous for the high quality of its high carbon, alloy and stainless steel wire rods, Kobe Steel exports to every major area of the world.

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Main Products: Wire Rods — High and Low Carbon Steel, Alloy and Stainless Steel
Wire Products · Bars, Pipes and Tubes · Arc Welding Electrodes · General Machinery

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 135

Atlantic Steel Co., Atlanta, has withdrawn its published base price on reinforcing bars. It has been quoting $5 per 100 lb, but all future orders will be priced on a negotiated basis. The action is in line with that taken some time ago by several other large concrete bar producers.

Demand for reinforcing bars is off seasonally, but it continues at a relatively high level. Imported bars are quoted $25 to $30 a ton under the domestic product. It's reported that rebar sales volume this year will top 1960's, but shipments by the domestic mills will be off because of imports.

Distributors . . .

Prices, Page 141

Orders for steel products booked by steel service centers are in fair volume. With fewer working days in November and yearend holidays in December, distributors estimate business those months will be smaller than October's.

Mill deliveries on some flat rolled items are lengthening slightly but not enough to cause concern in the trade. There is no evidence of stock building. Service centers in general have adequate stocks to cover demands; in some categories, they are on the heavy side.

Prices are weak in some districts, although they have firmed in the Southwest at relatively low levels. One operator in that area says there is not much chance that prices will move higher the rest of the year because of the pressure of imports.

Plates . . .

Plate Prices, Page 134

Wide plates are in a little tighter supply. One Midwestern mill is fully booked through December. Strip mill plates, however, are in easy supply. Demand for them is weak.

Requirements for pipe lines and freight car construction are virtually nil. Likewise, merchant ship needs

are lagging. Boiler manufacturers, however, are taking fair tonnage, and construction needs are holding up well despite seasonal slackening in some areas. Also, some improvement is noted in demand from machinery and industrial equipment accounts.

Bids on some sizable Navy work have been deferred twice, but indications are that the program will go ahead shortly.

Mill delivery promises range two to three weeks on sheared plates and ten days to two weeks on universal plates. Alloy plates are available in around four weeks.

Prices Reduced on Sodium Gluconate, Gluconic Acid

Price reductions averaging 5 cents a pound on sodium gluconate and 1.5 cents a pound on gluconic acid have been put into effect by Chas. Pfizer & Co. Inc., New York. Both products are sequestering agents used in bottle washing formulations, for rust removal, aluminum etching, for stripping paint from steel, and miscellaneous applications.

Seaboard Airline Orders 1100 New Freight Cars

Activity has picked up in the railroad equipment market with the placing of orders for 1100 freight cars by the Seaboard Air Line Railroad. The cars will cost about $14 million, and delivery will start in February. The railroad has also requested bids on 150, seventy ton hoppercars for transporting phosphate rock.

The orders for freight cars included 500, seventy ton steel boxcars to be built at the Bessemer (Ala.) plant of Pullman-Standard Inc., at a cost of $7.6 million. They'll be equipped with roller bearings and will have cushion underframes designed to absorb train movements. They also will have nailable steel floors and special bulkheads for added cargo protection, as well as aluminum doors.

Another 100, ninety ton, covered steel hoppercars, to be constructed for handling bulk commodities, will cost $1.4 million. Ninety-five will be built at the Clifton, N. J., plant of Magor Car Corp. The other five will be built by the American Car & Foundry Div., ACF Industries Inc., Berwick, Pa.

Greenville Steel Car Co., Greenville, Pa., received an order for 300, seventy ton, open top hoppercars used in hauling wet phosphate rock. They will cost $2.5 million. The Greenville company was also awarded an order for 200, seventy ton, steel, woodchip cars. (More cars of that type are being used as a result of the wood industry's wood conservation program.)

Gallium Prices Are Cut As Much as 25 Per Cent

Prices on all three grades of gallium were reduced by Aluminum Co. of America, Pittsburgh, effective Nov. 1. The greatest reduction—25 per cent—applies to large quantities of electronic grade (GA6). (It's the most frequently used of the three grades.)

The price revisions are attributed to improvements in processing and

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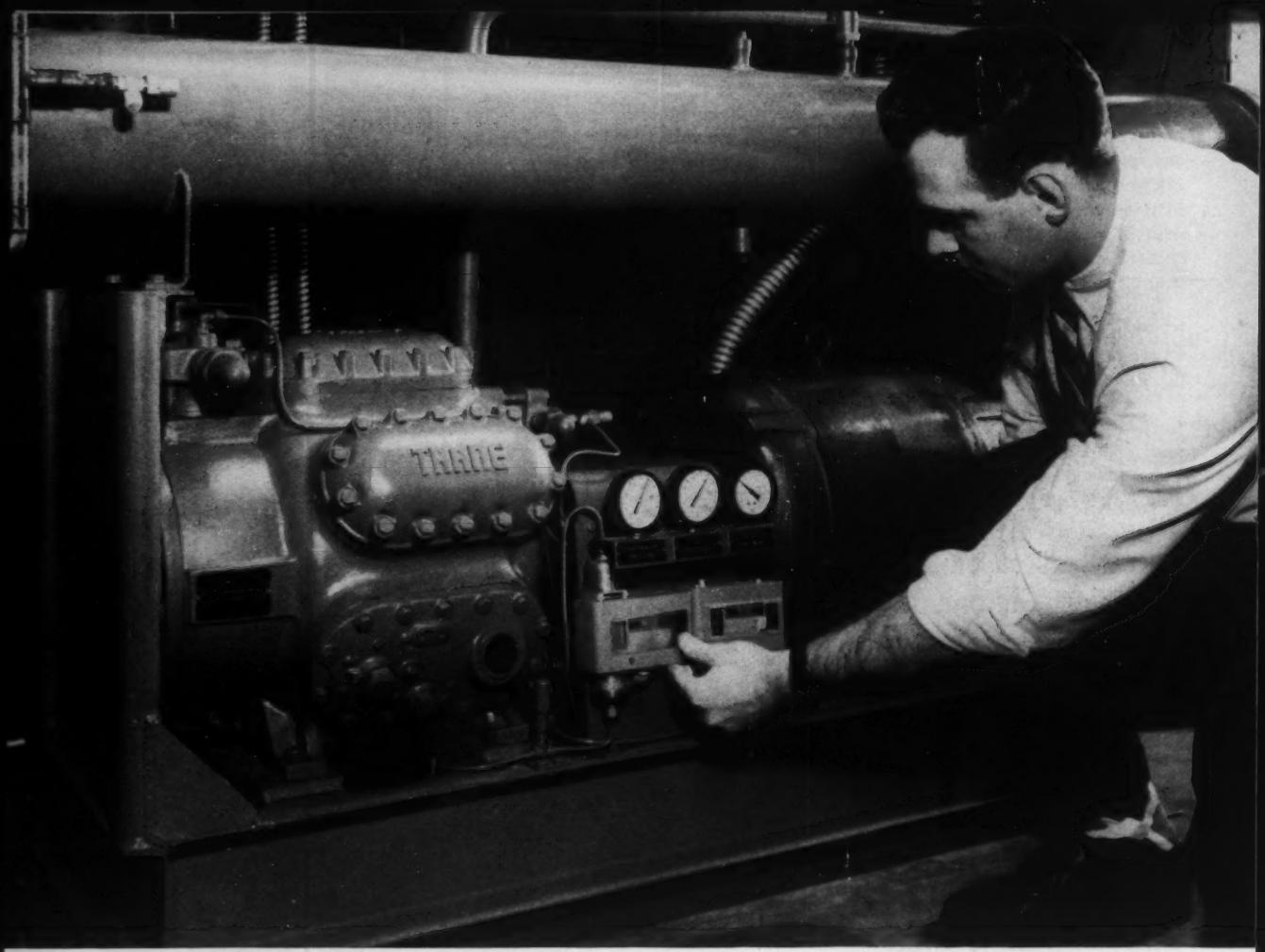

New Century 30 hp part-winding start motor driving reciprocating compressor. Compressor is part of an air conditioning system in an industrial test and research laboratory.

New Century Electric motor for part-winding start

Problem: power company restrictions limit inrush current . . . a part-winding start motor is called for, but . . . acceleration must be smooth and quiet with no risk of stalling at two-thirds of full speed.

Answer: the new Century part-winding start motor.

A special winding scheme makes this performance possible. So now you can have part-winding start, dependable power and smooth acceleration all in the same motor. Century part-winding motors provide the most economical and dependable way of starting equipment such as fans, blowers, centrifugal pumps and compressors, as well as reciprocating compressors with unloading valves (like the one shown here). They are available in 20 to 150 hp sizes and in speeds of 1200 and 1800 rpm.

Why do Century Electric part-winding motors provide reliable power? Here are a few of the reasons: windings are dipped and baked with several coats of a high temperature synthetic varnish which protect against oil fumes, mild acids, dust and grit . . . rotors are dynamically balanced so motors run smoothly and quietly . . . rugged cast iron frame gives long life and reduces noise level . . . coils are insulated with a tough polyvinyl resin.

For more information on Century's complete line of motors (1/20 to 400 hp) please contact your local Century Electric Sales Office or Authorized Distributor.

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manufacturing costs, plus increased volume, resulting from the production at new facilities at the company's Bauxite, Ark., works.

Gallium is a curiosity among the metals. The heat from your hand will melt it, and it remains liquid over a temperature range of several thousand degrees fahrenheit. Its uses in electronics and metallurgy are growing.

Tubular Goods . . .

Tubular Goods Prices, Page 140

Oil country goods are moving in about the same volume as they did in October. Users are ordering for needs in sight, but they're expected to begin showing interest in inventories because of anticipated steel labor trouble next year.

The Hughes Tool Co.'s weekly survey showed 1879 rotary oil rigs operating in the U. S. in the week ended Nov. 6, an increase of 59 over the preceding week's total. Canada had 139 active rigs, a decline of six.

Tennessee Gas Transmission Co., Houston, plans a $56.6 million expanison program for its South Texas to New England pipe line system. The program includes 210 miles of large diameter line, involving 76 miles of 36 in. pipe in Kentucky, Ohio, and Pennsylvania, 76 miles of 30 in. pipe in Pennsylvania and New York, and 58 miles of 20 in. gathering line in Louisiana.

Youngstown Sheet & Tube Co., Youngstown, is beginning production of buttress thread tubing for the oil and gas drilling industries.

October Steel Production Is Largest in 18 Months

For the first time in 18 months, steel production in October recrossed the 9-million-ton mark, reports the American Iron & Steel Institute. Output totaled 9,170,000 net tons. In April, 1960, 9,777,857 tons were poured.

Raw steel production in the first ten months of this year was 79,696,402 net tons, 9 per cent below the 87,269,820 tons produced during the like 1960 period. However, at midyear, output had been 26 per cent below that produced in the first half of 1960.

October production was up more than 250,000 tons compared with the 8,915,257 tons poured in September, and was up more than 2.3 million tons compared with output of 6,868,380 tons in October, 1960.

Steel Ingot Production—October, 1961

Period	Open Hearth (Net tons)	Bessemer (Net tons)	Basic Oxygen Process (Net tons)	Electric (b) (Net tons)	Totals (Net tons)	Index (a)
1961						
January	5,539,900	49,609	213,255	613,240	6,416,004	77.8
February	5,347,458	68,138	225,963	597,539	6,239,098	83.7
March	6,068,244	75,694	281,698	660,753	7,086,389	85.9
1st Quarter	16,955,602	193,441	720,916	1,871,532	19,741,491	82.4
April	6,551,518	65,503	269,991	697,675	7,584,687	95.0
May	7,743,927	79,758	342,251	814,690	8,980,626	108.9
June	7,375,876	85,494	323,589	766,897	8,551,856	107.1
2nd Quarter	21,671,321	230,755	935,831	2,279,262	25,117,169	103.7
1st Half	38,626,923	424,196	1,656,747	4,150,794	44,858,660	93.1
July	7,131,419	78,585	254,245	627,709	8,091,958	98.1
August	7,511,016	81,554	297,406	770,551	8,660,527	105.0
*September	7,696,138	85,509	377,175	756,435	8,915,257	111.7
*3rd Quarter	22,338,573	245,648	928,826	2,154,695	25,667,742	104.8
*9 Months	60,965,496	669,844	2,585,573	6,305,489	70,526,402	97.1
†October	7,848,000	70,000	446,000	806,000	9,170,000	111.1
1960						
January	10,510,616	211,132	280,981	1,046,675	12,049,404	146.1
February	9,715,527	216,263	245,458	949,558	11,126,806	144.2
March	10,103,122	202,812	306,741	952,008	11,564,683	140.2
1st Quarter	30,329,265	630,207	833,180	2,948,241	34,740,893	143.4
April	8,603,306	105,336	302,763	766,452	9,777,857	122.5
May	7,844,140	73,010	309,505	603,817	8,830,472	107.0
June	6,441,594	80,344	314,766	568,169	7,404,873	92.7
2nd Quarter	22,889,040	258,690	927,034	1,938,438	26,013,202	107.4
1st Half	53,218,305	888,897	1,760,214	4,886,679	60,754,095	125.4
July	5,494,331	61,700	289,003	505,890	6,350,924	77.0
August	5,860,394	52,652	279,550	645,404	6,838,000	82.9
September	5,525,244	42,228	287,323	603,626	6,458,421	80.9
3rd Quarter	16,879,969	156,580	855,876	1,754,920	19,647,345	80.2
9 Months	70,098,274	1,045,477	2,616,090	6,641,599	80,401,440	110.3
October	5,917,780	56,914	270,450	623,236	6,868,380	83.3
November	5,308,894	51,246	257,286	554,514	6,171,940	77.3
December	5,042,558	35,559	202,330	559,394	5,839,841	70.8
4th Quarter	16,269,232	143,719	730,066	1,737,144	18,880,161	77.1
2nd Half	33,149,201	300,299	1,585,942	3,492,064	38,527,506	78.7
Totals (1960)	86,367,506	1,189,196	3,346,156	8,378,743	99,281,601	101.9

*Revised. †Preliminary. (a) Index based on average production 1957-59 as 100. (b) Includes crucible steel. Data from American Iron & Steel Institute.

SUPER ALLOYS...

SPECIAL METALS...

SPECIAL !! RUSH!

Ulbrich Stainless is precision rolled to close tolerances on Sendzimir Mills such as the one pictured here in operation.

Ferrous, nickel and super alloys plus special metals in coil form are all stocked in quantity at Ulbrich. Coils in gauges down to .001 all tempers and other specific requirements. Weights from 1 ounce to 2,000 pounds or more. Write for complete Ulbrich stock list on special metals and super alloys plus stainless steel strip.

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Steel Output Continues Steady

FALTERING demand for steel products is holding down ingot production. Over the last six weeks, output has averaged about 2,050,000 tons, and it is expected to show only moderate improvement over the balance of the year. STEEL estimates output for the week ended Nov. 18 at 2,044,000 tons, a decline of 0.1 per cent from the previous week's total.

• **Pittsburgh** — Steelmaking operations here dipped about 2 points during the week ended Nov. 18. A leading producer took three open hearths out of production because of seasonal weakness in demand for some of its products. Operations during the week ended Nov. 12 averaged 70 per cent of 1960 capacity.

• **Los Angeles**—Slackening demand pushed the Western District rate down 4 points to an estimated 78 per cent of 1960 capacity.

• **Birmingham** — The steelmaking rate for the Birmingham-Gadsden-Atlanta area of the Southern District dipped 1 point to about 63.5 per cent of 1960 capacity for the week ended Nov. 18.

• **Chicago**—Steelmaking operations were scheduled at 76 per cent of 1960 capacity in the week ended Nov. 18, a gain of 2 points. Several mills plan to add furnaces and boost finishing operations over the next few weeks in anticipation of an improvement in the steel order pattern.

• **Philadelphia** — Northeastern District operations leveled off during the week ended Nov. 18. In the week ended Nov. 11 the AISI index dropped 6 points to 102.

• **Youngstown**—The operating rate here held at 61 per cent during the week ended Nov. 18. Youngstown Sheet & Tube Co. reports a good upturn in flat rolled steel orders. It has speeded up output by using two open hearth furnaces with oxygen jet lances and by charging larger quantities of hot metal into its open hearths.

Tool Steel . . .

Tool Steel Prices, Page 140

Shipments of tool steels (excluding hollow drill steel) in September totaled 6649 net tons, reports the American Iron & Steel Institute. In August, shipments were 6645 tons, and in September, 1960, they were 5743 tons.

The total movement in the first nine months this year was 56,886 net tons, down 12,506 tons from the 69,392 tons moved in the same period last year.

Canadian Government Finances Export Sales

The sale of 70 diesel electric locomotives (valued at $14 million) to Argentina was recently completed with the help of the Canadian government. It provided $12.5 million in loans to finance the deal. The Canadian government has a new program of financing exports of capital goods. So far, it has aided in two other major transactions.

The locomotive contract will provide some 1.8 million manhours of employment. Canadian General Electric Co. Ltd. and Dominion Engineering Co. will be the principal equipment suppliers to the Montreal Locomotive Works Ltd., which will build the locomotives.

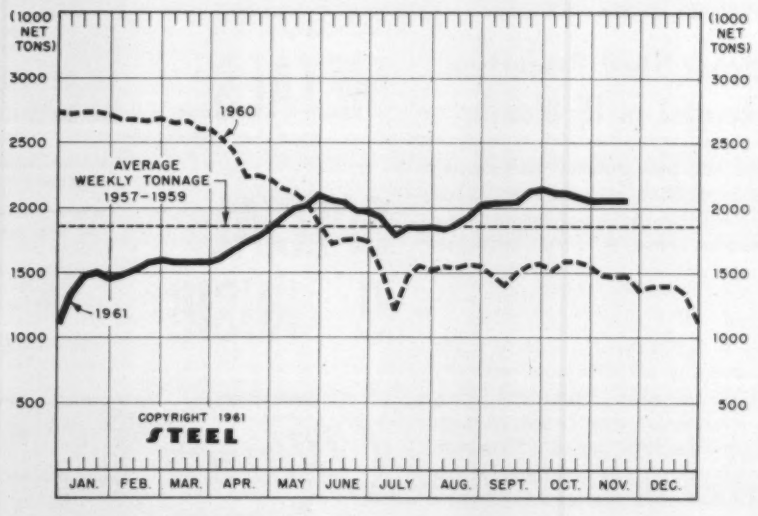
The government loan will be repayable by the Argentine State Railways over 9½ years. The other contracts: A $3 million locomotive order from Brazil, taken by the Montreal Locomotive Works; and a $12 million paper mill for Chili, contracted by John Inglis Co. of Canada and Sandwell & Co. Ltd. of Vancouver, B. C.

STEEL INGOT PRODUCTION

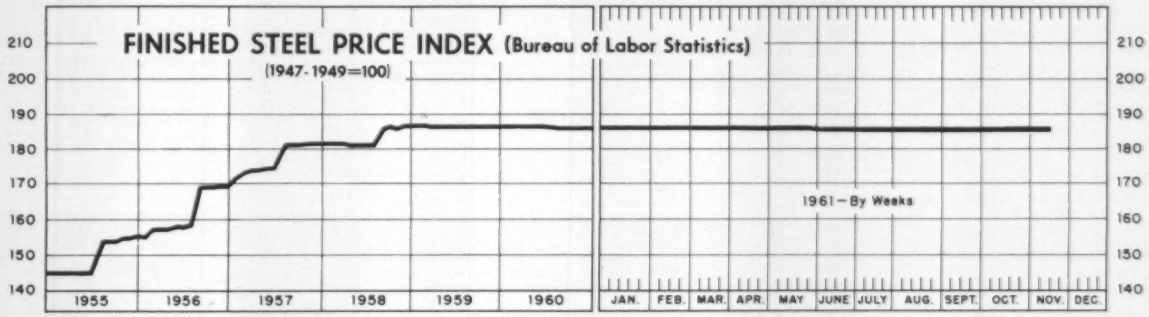
Weeks Ended	Net Tons	Change
Nov. 18	2,044,000*	— 0.1%
Nov. 11	2,046,000	+ 0.1%
Nov. 4	2,044,000	— 0.6%
Totals to Nov. 11		
1961	82,811,000	— 6.9%
1960	88,972,000	

DISTRICTS	Week Ended —Nov. 11— Tons‡	Index†	Week Ended Nov. 4 Index†
Northeastern	272,540	102	108
Buffalo	94,434	97	101
Pittsburgh	415,655	103	104
Youngstown	169,981	100	94
Cleveland	106,484	115	120
Detroit	154,228	147	136
Chicago	418,965	112	110
Cincinnati	104,059	138	133
St. Louis	65,688	125	128
Southern	111,648	103	101
Western	128,604	110	116
Industry	2,046,000	109.8	109.7

*Estimated by STEEL.
†1957-59 (1,862,933 tons) = 100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



Nov. 14, 1961	Week Ago	Month Ago	Oct. Index	Year Ago
185.4	185.4	185.4	185.4	186.2

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Nov. 14

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	(N.A.)
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.775
Sheets, C.R., Stainless, 302 (lb)	0.643
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.225
Strip, C.R., Stainless, 430 (lb)	0.460
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.495
Pipe, Galv. Buttweld (100 ft)	23.098
Pipe Line (100 ft)	195.423
Casing, Oil Well, Carbon (100 ft)	193.028
Casing, Oil Well, Alloy (100 ft)	302.645
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	192.285
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (Bundles)	7.647
Nails, 8d Common (50 lb)	4.715
Wire, Barbed (80-rod spool)	8.372
Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	Nov. 15 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg = 100)	247.82	247.82	247.82	247.82	225.92
Index in cents per lb	6.713	6.713	6.713	6.713	6.111

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$137.66
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	62.63
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	62.18
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	63.41
Steelmaking Scrap, GT	33.00	33.00	38.83	28.83	61.50

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Nov. 15 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	5.075
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	5.075
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.98	5.35
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.85
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	5.00
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	5.00
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.745	5.40
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.85
Plates, Chicago	5.30	5.30	5.30	5.30	4.85
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	5.25
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.85
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	5.35
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.75-5.85
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	6.30
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.95
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	7.20
Nails, Wire, nonstock, Pitts	8.95	8.95	8.95	8.95	8.20
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.85
SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$91.50
Wire rods, 7/32-5/8" Pitts.	6.40	6.40	6.40	6.40	5.80

PIG IRON, Gross Ton	Nov. 15 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$63.50
Basic, Valley	66.00	66.00	66.00	66.00	62.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.18	66.26
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.68	66.76
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	59.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	66.70
Malleable, Valley	66.50	66.50	66.50	66.50	63.00
Malleable, Chicago	66.50	66.50	66.50	66.50	63.00
Ferromanganese, net ton†	245.00	245.00	245.00	245.00	235.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$33.50	$33.50	$37.50	$26.50	$62.50
No. 1 Heavy Melt, E. Pa.	34.00	34.00	40.50	34.00	59.00
No. 1 Heavy Melt, Chicago	31.50	31.50	38.50	26.00	63.00
No. 1 Heavy Melt, Valley	33.50	36.50	39.50	26.50	66.50
No. 1 Heavy Melt, Cleve.	30.50	32.50	36.50	23.50	65.00
No. 1 Heavy Melt, Buffalo	29.50	29.50	32.50	23.50	59.50
Rails, Rerolling, Chicago	57.50	57.50	59.50	46.50	87.50
No. 1 Cast, Chicago	39.50	39.50	42.50	36.50	50.50
COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.50
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	17.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	29.50

Steel Prices

Mill base prices reported to STEEL, Nov. 15, cents per pound except as otherwise noted. Mill Code number following mill point indicates producing company. Key to producers, page 135; footnotes, page 139. *Changes shown in italics.*

SEMIFINISHED

INGOTS, Carbon Forging (NT)
Munhall,Pa. U5 .....$76.00

INGOT, Alloy (NT)
Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S33 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS
Carbon Rolling (NT)
Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 .....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 .....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 .....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 ..99.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 .....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. C8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14..99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ...109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 .121.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ...119.00
Johnstown,Pa. B2 ...119.00
Lackawanna,N.Y. B2 .119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 .....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2, U5, W14..119.00
S.Duquesne,Pa. U5 ....119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2, W14..122.50
S.Duquesne,Pa. U5 ....122.50
Warren,O. C17 .....122.50

SKELP
Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. P5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
Alabama City,Ala. R2 ...6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 .....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
Indiana Harbor,Ind. Y1 .6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
Kansas City,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Buffalo S47 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 .....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
Sparrows Point,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
Alabama City,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1.5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
Kansas City,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14..5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 .....5.50
Struthers,O. Y1 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
Indiana Harbor,Ind. I-2 .5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N5 .....5.50
Weirton,W.Va. W6 .....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14 .6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 .....8.10
Kansas City,Mo. S5 .....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Phoenixville,Pa. P4 ....8.10
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14 ..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 .....8.05
Lackawanna,N.Y. B2 ...8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ...6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
Alabama City,Ala. R2 ..5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ...5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
Granite City,Ill. G4 .....5.40
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1.5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B2 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14..5.30
Sparrows Point,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. P4 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
Sparrows Point,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 .....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1 .7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
Sparrows Point,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
Sparrows Point,Md. B2 ..7.50
Youngstown Y1 .....7.50

PLATES, Ingot Iron
Ashland c.l. (15) A10 ..5.55
Ashland l.c.l. (15) A10..6.05
Cleveland c.l. R22 .....6.05
Warren,O. R2 .....6.05

FLOOR PLATES
Cleveland J5 .....6.375
Claymont,Del. P4 .....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ...5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
Kansas City,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Buffalo S47 .....5.675
Owensboro,Ky.(9) G8..6.025
Pittsburg,Calif.(9) C11..6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 .....6.425
Riverdale,Ill.(9) A1 ...5.675
Seattle(9) A24,B3,N15..6.425
S.Ch'g'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9) B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 .....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 .....6.025
Youngstown(9) R2, U5.5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 .....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 .....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
N.Tonawanda S47 .....6.725
Owensboro,Ky. G8 .....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES
Wrought Iron
Economy,Pa. B14 .....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 .....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Leaded (Including leaded extra)
Carbon
LosAngeles P2, S30 ..11.75*
Alloy
Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 .....10.35
SpringCity,Pa. K3 .....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 .....7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 .....8.10
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, H5, P17 ...7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 .....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 .....7.65
SpringCity,Pa. K3 .....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 .....7.65

BARS, Cold-Finished Alloy (Turned and Ground)
Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 .....9.025
Detroit B5, P17 .....9.225
Detroit H5, S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ...9.025

Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 ....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ..11.00
Mansfield,Mass. B5 ....9.325
Massillon,O. R2, R8 ..9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
N.Tonawanda S47 .....9.025
Plymouth,Mich. P5 ....9.225
S.Chicago, Ill. W14 ....9.025
SpringCity,Pa. K3 .....9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 .....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

Atlanta A11 .....5.00
Birmingham C15 .....5.25
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fontana,Calif. K1 ....6.375
Ind.Harbor,Ind. Y1 ....5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.475
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. W14 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill.(1) N15 ...5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ..6.10
Williamsport,Pa. S19 ..5.75

BARS, Reinforcing, Billet (Fabricated, to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Johnstown,Pa. B2 .....7.33
Lackawanna,N.Y. B2 ...7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 ....7.35
Seattle A24, B3, N14 ..7.95
Williamsport,Pa. S19 ..7.00
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 16.10
Economy,Pa.(D.R.)B14 20.50
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 20.50
McK.Rks.(S.R.) L5 ...16.10
McK.Rks(D.R.) L5 ...20.50
McK.Rks.(Dir.Rolled)L513.55

BARS, Rail Steel

ChicagoHts.(3) C2, I-2 5.575
ChicagoHts.(4) (44) I-2 5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ...5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 .....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 .....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ....7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 .....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ....6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ...9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.125	....
Ashland,Ky. A10	7.125	7.375
Canton,O. R2	7.125	....
Fairfield,Ala. T2	7.125	7.375
Gary,Ind. U5	7.125	7.375
GraniteCity,Ill. G4	7.225	....
Ind.Harbor I-2	7.125	7.375
Irvin,Pa. U5	7.125	7.375
Kokomo,Ind. C16	7.225	....
MartinsFry. W10	7.125	7.375
Pitts.,Calif. C11	7.875	....
Pittsburgh J5	7.125	....
SparrowsPt. B2	7.225	....
Weirton W6	7.125	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.375

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10(type 1) 9.525
Butler,Pa. A10(type 2) 9.625
Irvin,Pa. U5 (type 1)..9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield,O. C3 .....7.50
Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 .....7.50

SHEETS, Galvanized Steel Hot-Dipped§

AlabamaCity,Ala. R2 .6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 .....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.H'rb'r,Ind. I-2, Y1 6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ...6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ...6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous. §For minimum spangled add 0.15c.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11 Branford Machine & Mfg.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire Div., Hoover Ball & Bearing
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
J10 Jay Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N17 National Steel Corp.
N20 Neville Ferro Alloy Co.

O1 Ohio Ferro-Alloys Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P10 Precision Strip Mill Div., Solar Steel Corp.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 ,Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P25 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div. Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S31 Sawhill Tubular Products
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada
S47 Seaway Steel Div., Roblin-Seaway Industries

T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Products & Chemical
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Div., National Steel Corp.
W8 Western Cold Drawn Steel Div., Standard Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L7 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1.5.10
Johnstown,Pa.(25) B2 ..5.10
Lackaw'na,N.Y.(25) B2.5.10
LosAngeles(25) B3 .....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 ....5.10
S.SanFrancisco(25) B3 ..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 ....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 .....8.40
S.Chicago,Ill. W14 ....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1.7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3.8.325
SparrowsPoint,Md. B2 ..7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 ....7.425
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.425
Ind.Harbor,Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ...7.525
NewBedford,Mass. R10 7.875
NewBritain,Conn. S15 .7.875
NewCastle,Pa. B4, M23.7.425
NewHaven,Conn. D2 ..7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Riverdale,Ill. A1 .....7.425
RiverRouge,Mich. P16..7.425
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ..8.875
Warren,O. R2, T5 ....7.425
Worcester,Mass. A7 ...7.975
Youngstown S41, Y1 ...7.425

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Carnegie,Pa. S18 .....15.55
Cleveland A7 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 .....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. S8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ...10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N2	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
RiverRouge,Mich. P10	9.05	10.50	12.70	....	....
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	....	....	18.85	22.95	27.80
Buffalo W12	....	....	18.85	....	....
Fostoria,O. S1	....	....	19.05	22.15	....
FranklinPark,Ill. T6	....	....	19.20	23.30	28.15
Harrison,N.J. C18	....	....	18.85	22.95	27.80
NewYork W3	....	....	18.85	22.95	27.80
Palmer,Mass. W12	....	....	18.85	....	....
Trenton,N.J. R5	....	....	18.85	22.95	27.80
Worcester,Mass. A7, T6	....	....	18.85	22.95	27.80
Youngstown S41	....	....	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7 .....4.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ...7.50*
NewCastle,Pa. M23 ...7.425*
Riverdale,Ill. A1 .....7.425*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ...7.975
Youngstown S41 .....7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Basis Weight 45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless,Pa. U5	6.10	6.25	6.40	6.55
Gary,Ind. U5	6.10	6.25	6.40	6.55
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irwin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

TIN PLATE, Electrolytic (100 lb basis wt)	0.25 lb Coating
Aliquippa,Pa. J5	$9.10
Fairfield,Ala. T2	9.10
Fairless,Pa. U5	9.10
Fontana,Calif. K1	9.75
Gary,Ind. U5	9.10
GraniteCity,Ill. G4	9.20
Ind.Harb.,Ind. I-2, Y1	9.10
Irvin,Pa. U5	9.10
Niles,O. R2	9.10
Pittsburg,Calif. C11	9.75
SparrowsPt.,Md. B2	9.10
Weirton,W.Va. W6	9.10
Yorkville,O. W10	9.10

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$8.20
Fairfield,Ala. T2	8.20
Fairless,Pa. U5	8.20
Fontana,Calif. K1	8.85
Gary,Ind. U5	8.20
GraniteCity,Ill. G4	8.30
Ind.Harbor,Ind. I-2, Y1	8.20
Irvin,Pa. U5	8.20
Niles,O. R2	8.20
Pittsburg,Calif. C11	8.85
SparrowsPoint,Md. B2	8.20
Weirton,W.Va. W6	8.20
Yorkville,O. W10	8.20

ELECTRO. TIN-COATED SHEET

(20-27 gage; per 100 lb)	
IndianaHarb.,Ind. Y1	$7.90
(21-27 gage; per 100 lb)	
Aliquippa,Pa. J5	$7.90
Niles,O. R2	7.90

TIN PLATE, HOT DIPPED COMMON COKE	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.40	10.65
Fairless,Pa. U5	10.40	10.65
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.05	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

HOLLOWARE ENAMELING (Black plate) (29 Gage)

Aliquippa,Pa. J5 .....7.85
Gary,Ind. U5 .....7.85
GraniteCity,Ill. G4 .....7.95
Ind.Harbor,Ind. Y1 ....7.85
Irvin,Pa. U5 .....7.85
Yorkville,O. W10 .....7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Mansfield,O. E6	8.10
Vandergrift,Pa. U5	8.10
Warren,O. R2 (Locore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. §Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ...8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. M8. 8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 .....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 .....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ....8.25
Monessen,Pa. P7, P16 ..8.00
N.Tonawanda S47 .....8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ....8.95
Portsmouth,O. P12 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00
Buffalo S47 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa.(10) B2 .12.65
KansasCity,Mo. U3 ....12.90
LosAngeles(2) B3 .....13.60
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16 .12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ....12.95
Palmer,Mass. W12 .....13.70
Pittsburg,Calif. C11 ....13.45
Portsmouth,O. P12 .....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md.(10)B2 12.75
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ....12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
NewHaven,Conn. A7 ..10.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ..10.075
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ..10.075
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ...10.05

WIRE, MB Spring, High-Carbon

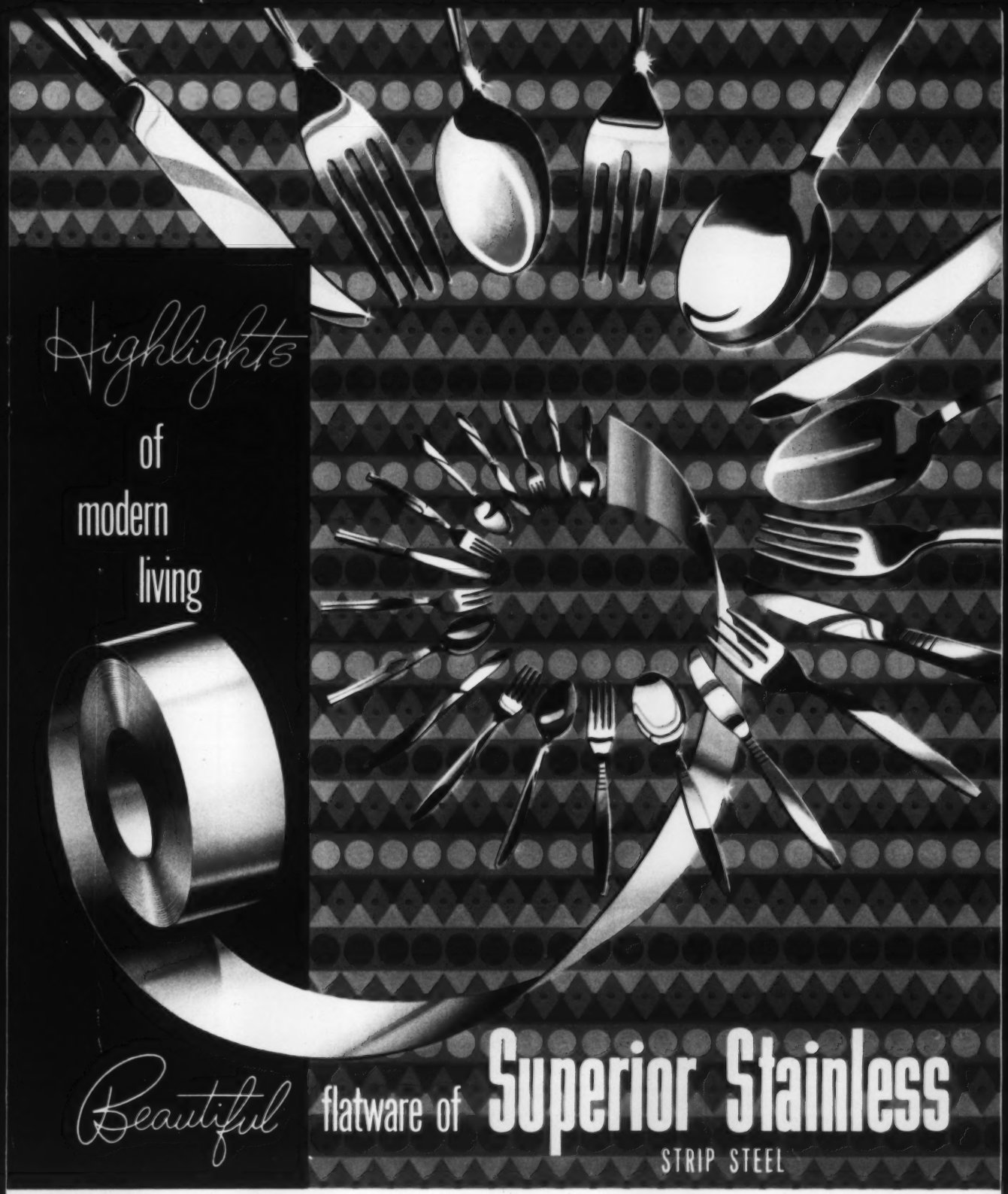
Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.20
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ...10.20
Portsmouth,O. P12 .....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ...10.20
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 .....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ..16.65
Johnstown,Pa. B2 .....16.30
KansasCity,Mo. S5 .....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ...16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 .....16.60
S.SanFrancisco C10 ...17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7,J6.16.60

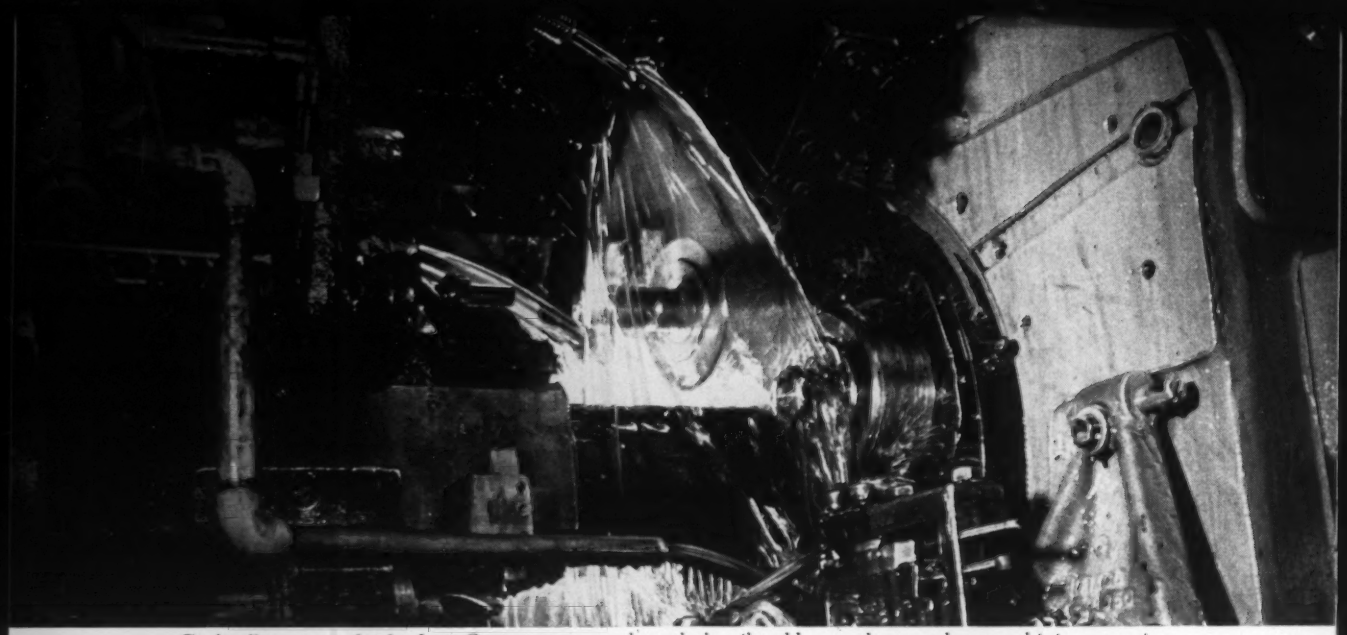
ROPE WIRE	(A)
Bartonville,Ill. K4	13.45
Buffalo W12	13.45
Fostoria,O. S41	13.45
Johnstown,Pa. B2	13.45
Monessen,Pa. P7	13.45
Muncie,Ind. I-7	13.65
Palmer,Mass. W12	13.75
Portsmouth,O. P12	13.45
Roebling,N.J. R5	13.75
St.Louis L8	13.45
SparrowsPt.,Md. B2	13.55
Struthers,O. Y1	13.45
Worcester,Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.



From the kitchen, to the finest tables in the land! That's the progress of modern stainless flatware —thanks to new-day design and finish. • Superior Stainless Strip Steel is chosen widely for flatware applications because of its *superior uniformity and fabricating ease.* From our bright coils come stainless pieces practical for the hardest service, handsome enough for Sunday best!

SUPERIOR STEEL DIVISION
OF
COPPERWELD STEEL COMPANY
CARNEGIE, PENNSYLVANIA
For Export: Copperweld Steel International Company, New York



Garia oils are completely clear. Operators can see through the oil and keep a close watch on machining operation.

CUTTING:

Shell puts heavy-duty properties into transparent cutting oils that lengthen tool life three significant ways

Today, Shell's new Garia® Oils are helping machine shops improve metal finish and prolong tool life —even in heavy-duty cutting. And because Garia is transparent, operators can see the work at all times.

Read how Shell Garia Oils can reduce rejects, cut maintenance and overhead costs in your shop.

UNTIL RECENTLY, most heavy-duty cutting oils were opaque fluids which obscured the work.

Shell scientists took up the problem. They experimented with different formulae until they found the *exact combination* that retained the necessary properties—but did not seriously darken the oil.

Now Shell Garia Oils have the transparency of light mineral oils and the rugged qualities of heavy-duty oils.

With Shell's improved Garia Oils, operators can see through the oil film. Work can be inspected more easily.

Garia Oils prolong tool life in three key ways:

1. Garia Oils help prevent metal pick-up. Shell Garia Oils form a more effective film between the work and the tool. This provides better anti-weld protection, and helps prevent metal pick-up on tools.

2. Garia Oils help keep work cooler. Even with high-speed cutting, the metal stays cool.

Cooling helps extend tool life, and helps assure a better finish on the work. Operating costs are lower too.

3. Garia Oils wet faster. They reach the tool point rapidly, cover newly exposed surfaces quickly.

Compact range

Today's range of Garia Oils covers every kind of metal cutting operation.

Result: you do not have to carry large cutting oil inventories. You can do more jobs with fewer Garia Oils.

For all the facts, see your Shell Industrial Products Representative. Or write: Shell Oil Company, 50 West 50th Street, New York 20, N. Y.

SHELL

A BULLETIN FROM SHELL
—where 1,997 scientists are working to provide better products for industry

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7, T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill. (7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler
(14½ Ga.) (per 97 lb net box)
Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	9.02
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	9.02
Kokomo,Ind. C16	8.88
LosAngeles B3	9.20
Minnequa,Colo. C10	8.02
Pittsburg,Calif. C11	9.20
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.20
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand. 100 lb coil

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	9.30
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	9.30
Kokomo,Ind. C16	9.16
LosAngeles B3	9.50
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.50
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	9.50
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim 100 lb coil

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	9.35
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	9.35
Kokomo,Ind. C16	9.21
LosAngeles B3	9.55
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.55
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	9.55
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80†‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	17.95	19.80†‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass. W12	19.10	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran.C10	18.20	19.75**
SparrowsPt. B2	17.95	19.75§
St'ling(37) N15	17.95	19.80
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½Ga. J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
S.Chicago,Ill. R2	187**
Sterling,Ill. (7) N15	192

WIRE, Merchant Quality 6 to 8 gage

	An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	9.00	9.75*
Bartonville(48) K4	9.10	9.85
Buffalo W12	9.00	9.55†
Chicago W13	9.00	9.55**
Cleveland A7	9.00	....
CrawfordsvilleM8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55
Houston(48) S5	9.25	9.80**
Jack'vill.,Fla. M8	9.10	9.80‡‡
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
S.SanFran. C10	9.95	10.50**
S.Chicago R2	9.00	9.55**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass. A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.10c. **Subject to zinc equalization extras.

FASTENERS

SCREWS, NUTS, BOLTS

(Consumer discounts per cent off list prices, plain finishes. For less than full container quantities, add 25 per cent; attaching nuts to bolts in sizes ¼ in. through ⅝ in. diameter through 8 in. in length, price on application. Discounts are determined by the quantity of screws, nuts, and bolts ordered for one destination at one time.)

Base, one keg	43.00
20,000 lb or more	53.00

SCREWS, SETSCREWS

Hex Screws and High Strength Hex Screws, through 1 in. x 12 in.:

Base, one keg	43.00
20,000 lb or more	53.00

Hex Screws 1⅛ in. diameter and larger: See net price schedule.

Fillister Head Screws, coarse thread:

Packages	+70.00
Bulk	+28.00

Flat Head Screws, coarse thread:

Packages	+100.00
Bulk	+52.00

Setscrews, Square Head, Cup-point, coarse thread:

Packages	+10.00
Bulk	15.00

(Bulk discounts on fillister, flat head, and setscrews apply only to products ordered in these minimum quantities: ¼ in. through ⅜ in. diameter, 15,000 pieces; 7/16 in. through ⅝ in. diameter, 5000 pieces; and ¾ in. through 1 in. diameter, 2000 pieces.)

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in. larger 12.85
7/16 in. and smaller by 6 in. and shorter, 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over.)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2½	12	49.24	57.72	43.70
2¾	12	54.23	63.57	48.13
2½	12	58.73	68.83	52.13
2¾	12	62.62	73.40	55.59
3	12			

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.725
Steelton,Pa. B2	5.75	5.65	....	....

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2⅝ in. and smaller hexagons; 9.625c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.25	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; Bars; C.F. Wire	Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	41.50	43.50	39.25	48.50	43.50
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	46.75
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	45.00
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
304L	....	37.25	47.25	48.25	52.00	54.50	50.00	59.75	57.25
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	98.75	98.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	76.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	84.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	62.25
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 Cb-Ta	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	75.25
403	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	38.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	42.00
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; Branford Machine & Mfg. Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Elwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Phoenix Steel Corp.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels, Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloy Steel Co., Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Claymont, Del. P4; Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.165
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
NorthTonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	78.11	78.61	79.11	....
Rochester, N.Y., deld.	69.87	70.37	70.87	....
Syracuse, N.Y., deld.	71.22	71.72	72.22	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
SouthChicago, Ill. R2	66.00	66.50	66.50	67.00
SouthChicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland A7, R2	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
NevilleIsland, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Other U. S. Districts				
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
GraniteCity, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
PortColborne, Ont. A25	65.00	65.00	65.50	66.00
SaultSte. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.60%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%. Foundry grade, 1.75% or under, deduct 50c.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
PortColborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.45% max P)

CalvertCity, Ky. P15	$99.00
NiagaraFalls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Chicago I-3 (Phos. 0.075% max)	71.00
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Phos. 0.075% max)	71.00
Erie, Pa. I-3 (Phos. 0.075% max)	71.00
NevilleIsland, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS				PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	STRUCTURAL SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	9.50	10.26	10.06	11.25	9.65	11.70	16.38	9.85	9.60	11.10
Birmingham	8.46	10.20	10.59	9.45	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.90	10.40	11.52	12.40	10.05	13.35	16.59	10.50	9.83	11.85
Buffalo	9.30	10.05	11.80	11.70	9.45	11.45	16.30	9.90	9.40	11.80
Charlotte, N. C.	9.95	11.22	10.55	11.35	10.00	12.68	....	10.20	9.95	11.75
Chicago	9.22	10.20	10.13	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.38	10.26	10.18	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	9.07	9.88	11.75	10.63	8.48	12.98	16.95	8.71	8.31	9.68
Detroit	9.48	10.46	10.50	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	8.67	9.48	11.35	10.23	8.08	13.10	16.55	8.31	8.00	9.28
Indianapolis	9.66	10.64	10.57	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.10	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.27	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9 57	10.55	10.48	11.74	9.57	11.00	16.30	9.92	9.41	11.70
Newark, N. J.	9.81	10.34	11.35	11.37	10.05	13.25	16.40	10.35	9.04	11.82
New York	9.81	10.34	11.35	11.37	10.05	13.25	16.40	10.35	9.04	11.82
Philadelphia	9.50	10.00	10.66	11.25	9.65	11.95	16.38	9.85	9.60	11.10
Pittsburgh	9.22	10.53	11.68	11.49	9.22	11.25	15.95	9.57	9.06	11.35
Portland, Oreg.	10 40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	10.51	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	8.82	9.49	10.64	10.99	8.82	11.49	16.54	9.17	8.66	10.95
San Francisco	10.65	11.65	11.75	12.70	10.55	15.10	17.25	11.10	10.80	12.95
Seattle	11.35	12.45	13.40	12.80	10.80	16.20	17.85	11.50	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.05	17.70	11.35	10.80	13.45

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ¼ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plate, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hitchins, Olive Hill, Ky., Athens, Troup, Tex., Clearfield, Curwensville, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., Frostburg, Md., $133; Templeton, Pa., $135; Salina, Pa., $138; Niles, Ohio, $139; Lehi, Utah, $175.

Super-Duty: Ironton, Ohio, St. Louis, Mexico, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Frostburg, Md., $200; Stevens Pottery, Ga., $210; Troup, Tex., $215; Lehi, Utah, $263.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Hawstone, Thompsontown, Pa., Ensley, Ala., Portsmouth, Ohio, St. Louis, $158; Warren, Niles, Windham, Ohio, $163; E. Chicago, Ind., Joliet, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $133; Philadelphia, Clearfield, Pa., $138; Warren, Ohio, $148.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Johnstown, Pa., Vandalia, Mo., $97; Chester, New Cumberland, W Va., Freeport, Vanport, Merrill Station, [illegible]ld, Pa., Wellesville, Irondale, New Salisbury, Ohio, $100; Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120; Lehi, Utah, $175.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $250; Danville, Ill., $253; Fords, N. J., Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., Frostburg, Md., $260; Troup, Tex., $265.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $320; Troup, Tex., Fords, N. J., Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $360; Troup Tex., Fords, N. J., Philadelphia, $365.

Tar Beaded Brick (per ton)

Dolomite: Nario, Ohio, $87.50. Dolomite-Magnesite: Hays, Pa., Hammond, Ind., $107; Nario, Ohio, $109.50. Magnesite: Nario, Ohio, $128; Hays, Pa., Hammond, Ind., $130.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310; Reesdale, Pa., $355.

Runners (per 1000)

Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234; Reesdale, Pa., $245.

Dolomite (per ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Nario, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines, Chewelah, Wash., $46; minus ⅝ in. grains bulk, Luning, Nev., $46; ⅝ in. grains with fines (periclase), Baltimore, $73, Pascagoula, Miss., $90.

*—9 in. x 4½ x 2.50 straights.

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:	
Carbon (N.T.):	
Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00
Wire Rods:	
Carbon	5.70
Alloy	6.40
Wire (carload lots):	
Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85
Bars & Small Shapes:	
Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40
Bar Mill Brands:	
Carbon	5.40
Alloy	8.05
Bars, Reinforcing	5.30
Structural Shapes:	
Standard carbon	5.50
Angles & zees	5.40
Plates, Carbon:	
Sheared	5.45
Universal mill	5.10
Sheets & Coils, Hot Rolled:	
Carbon sheet	4.95
Carbon strip	5.00
Sheets & Coils, Cold Rolled:	
Carbon sheet	6.35
Carbon strip:	
(0.080 and lighter)	6.35
(0.081 and heavier)	6.35
Sheets & Coils, Galvanized:	
Standard quality	6.70
Culvert quality	7.00
Sheets, Porcelain Enameling	7.45
Sheets & Coils, Electrical:	
Field grade	9.00
Electrical grade	10.15
Sheet piling	6.15
Skelp	4.70
Rails, Heavy	5.55
Rails, Light	5.70
Joint Bars	6.55
Tie Plates	6.35
Grinding Balls (3 in. diam.)	7.00

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh bags	7.50††
Electrolytic Iron, Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in. (In contract lots of 750 tons price is 22.75c)	27.75
Annealed, 99.5% Fe, ton deld. east of Mississippi.	36.75,
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 42.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	37.80
Bronze powder, 90-10	56.80
Copper, all types	15.00*
Lead	7.50*
Manganese, 500 lb and up	25.00*
Nickel, all types	0.78-1.06
Nickel-Silver	56.00
Solder	7.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4600	32.00
Tin	14.00*
Zinc	23.20
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5% below 5 microns	2.32
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. (Source of shipment: Western Continental Europe.)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.15	....	$5.10	$5.00	$5.30
Bar Size Angles	5.15	....	5.10	5.00	5.30
Structural Angles	5.05	....	5.00	4.90	5.20
I-Beams	5.05	....	5.00	4.90	5.20
Channels	5.15	....	5.10	5.00	5.30
Plates (basic bessemer)	5.30	....	5.25	5.15	5.45
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	24.16	....	24.09	23.81	25.54
Barbed Wire (†)	6.25	....	6.20	6.10	6.40
Merchant Bars	5.15	....	5.10	5.00	5.30
Hot-Rolled Bands	5.65	....	5.60	5.50	5.80
Wire Rods, Thomas No. 5 (Niederrhein)	5.80*	....	5.75	5.75	6.00
Wire Rods, O.H., No. 5 (Niederrhein)	6.00*	....	5.95	5.95	6.20
Bright Common Wire Nails (§)	7.15	....	7.10	7.00	7.30
(Source of Shipment: Japan)					
Wire, galvanized	$5.62	....	$5.62	$5.62	$5.57
Wire, bright	7.60	....	7.60	7.60	7.55
Wire Rods, O.H. No. 5 (Sumitomo)	5.80	....	5.80	5.75	6.00
Strand, stress relieved (Sumitomo)					
⅜ in. diam, 1000 lineal ft	39.90	....	39.90	39.90	39.50
7/16 in. diam, 1000 lineal ft	53.50	....	53.50	53.50	53.00
Bright common wire nails	7.15	....	7.15	7.15	7.15

†Per 82 lb net reel. ‡Per 100 lb keg, 20d and heavier. *Except Boston.

Ores

Lake Superior Iron Ore

(Prices effective for the 1961 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi nonbessemer	$11.45
Mesabi bessemer	11.60
Old Range nonbessemer	11.70
Old Range bessemer	11.85
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1961; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian (lump), 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$14.75-15.00*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 82.00-85.00c nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75
48% no ratio	24.00-26.00†

Turkish

48% 3:1	35.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.40

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

60% min	$4.15-4.40
65% min	4.50-4.75

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75

Per ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa., 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3% for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max), Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%), Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices. For 3% grade, Si 12.5-16%, deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 5% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb. $1. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.27, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 24.00c per lb of contained Cr. Delivered.

Charge Chrome: Cr 58-65%, C 5.25% max, Si 3% max, S 0.03% max, 22.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, S 0.03% max, 23.00c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 58-65%, C 4.25% max, Si 1.0% max, S 0.03% max, 24.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Low-Carbon Ferrochrome: (Simplex) Cr 68-71%: C 0.025% max, 33.00c; C 0.010% max, 33.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Cr 68-73%; C 0.25% max, 33.50c. Cr 67-73% C 0.05% max, 33.00c; C 0.75% max, 32.00c; C 2.0% max, 32.5c, carlots, lump, bulk, delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr, Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25 max). 8M x D, carload, bulk, 36.50c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 11.50c per lb material; Cr 44-47%, Si 37-39%, C 0.15% max, 12.60c per lb material.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.5c per lb contained Si. Packed, c.l. 17.0c, ton lot 18.45c, less ton 20.1c f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). $2.45 per lb (all quantities) of contained W. Delivered.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3½ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 15.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.60 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-47% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l., packed 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-70%). Per lb of contained Mo in 2000-lb container, f.o.b. Langeloth and Washington, Pa., $1.89 in all sizes except powdered which is $1.95.

Technical Molybdic-Oxide: Per lb of contained Mo. in cans $1.60; in bags, $1.59, f.o.b. Langeloth and Washington, Pa.

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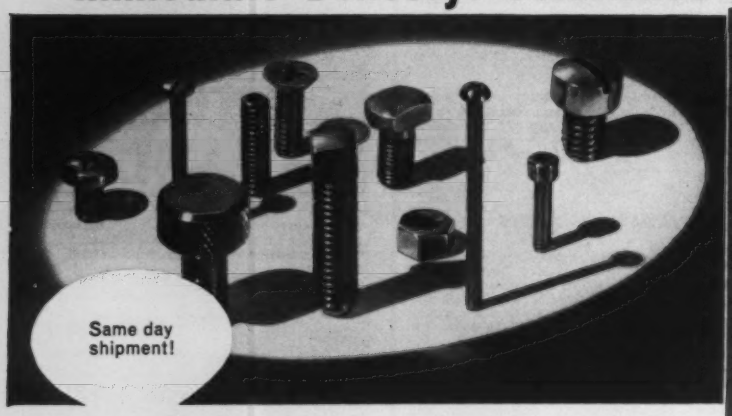

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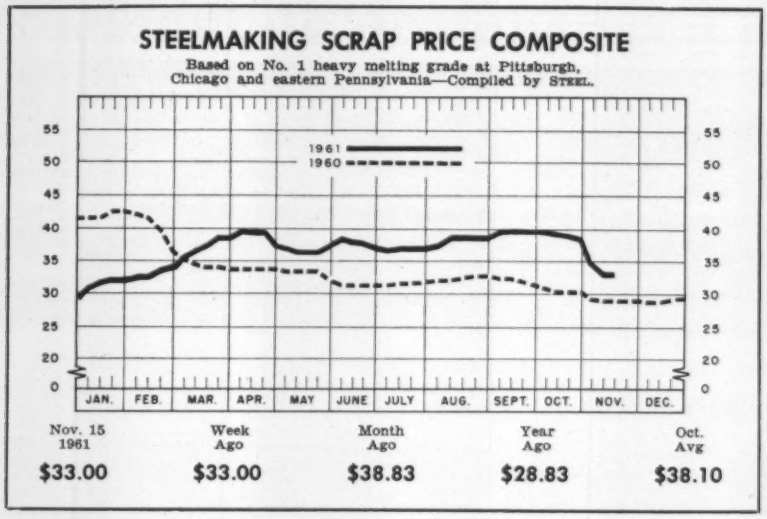


Scrapmen Seek Market Support

Awaiting new domestic and export buying movement to shore up sagging price structure. STEEL's index on No. 1 heavy melting unchanged, but prices are untested

Scrap Prices, Page 146

● **Chicago**—Prices are unchanged in a dormant market. Listed prices are purely nominal. They are untested, with the mills remaining out of the market—they are working off inventories accumulated in anticipation of a strong steelmaking rate. Some mills are still limiting the number of cars they'll accept in the delivery of scrap on old orders.

● **Philadelphia** — Following the sharp decline of a week ago, scrap prices are holding unchanged. Demand continues limited, but dealers are not forcing sales. Collections are coming in slowly to yards as result of the recent sharp drop in the market. The export movement continues to ease off.

● **New York** — Brokers' buying prices have steadied. The market undertone continues easy; there is little domestic buying, and export trading is still tapering. A further drop in 18-8 sheets, clips, and solids is reported to $145-$150.

● **Cleveland** — Activity is limited. The mills are showing little interest in dealer offerings, and not much buying is expected in coming weeks. Bids on monthend auto lists will point the way for prices generally.

● **Pittsburgh** — The downtrend of the last three weeks has been arrested. Although there's not much consumer interest, prices of most grades are stable. Trade sources expect the trend to be sidewise the rest of the year. If there's further weakness, it'll probably show up in brokers' bids on the December auto lists of factory bundles.

● **Detroit**—Prices are holding and brokers think the market will move upward on monthend auto lists. Only small orders are out at present. Larger offerings of 5000 to 7000 tons of prime grades are finding no takers.

● **Buffalo**—Prices continue to be weak, and some dealers are anticipating further reductions before the end of this month. Export demand is quiet. Except for No. 2 bundles and short shoveling turnings, little scrap is moving to local mills. The cast market is holding, but prices face an early test.

● **Cincinnati**—The market appears to be a little firmer following the recent display of weakness. General feeling in the trade is that the bottom has been hit, and this is borne out by mounting resistance by dealers to accept currently posted prices on small lots.

● **St. Louis**—The market is inactive, and some grades are off another $1 a ton, including No. 2 heavy melting, No. 1 bundles, heavy breakable cast, and stove plate.

● **Houston** — Dealers are marking time. No significant purchases have been made, and none is expected the rest of this year. The local mill is rationing incoming shipments after telling suppliers to stretch out November orders through December.

The export market is quiet. Mexican mills have delayed plans for re-entering the Texas market. South-of-the-border inventories are reported heavy.

Despite the lack of active consumer demand, most Southwest yards hold only normal inventories. Yard traffic has been slow for many weeks.

● **Seattle**—Dealers say the market is slightly firmer, but they are still reluctant to post a firm schedule of prices. They're awaiting the development of demand trends in the domestic and export markets. At present, exporters are concentrating on cleaning up contracts.

● **San Francisco**—The district market has firmed up following two weeks of successive price declines.

● **Los Angeles** — Export and domestic demand is at a minimum. Dealers are predicting further price weakness, anticipating a $2 to $3 a ton drop within two weeks. Such talk, however, is viewed by some traders as an attempt to push dealer buying prices down. No. 2 heavy melting is in large supply on docks. Stocks of other grades are ample.

Pig Iron . . .

Pig Iron Prices, Page 141

Merchant pig iron business is supporting production from only slightly more than 50 per cent of available blast furnaces. There is little prospect of any early improvement.

Foundries preparing for yearend inventory taking are buying hand

(*Please turn to Page* 151)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, No. 15, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Nov. 15	$33.00
Nov. 8	33.00
Oct. Avg.	38.10
Nov. 1960	28.83
Nov. 1956	61.83

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	*26.00-27.00*
No. 1 dealer bundles	34.00-35.00
No. 2 bundles	24.00-25.00
No. 1 busheling	33.00-34.00
No. 1 factory bundles	39.00-40.00
Machine shop turnings	*13.00-14.00*
Mixed borings, turnings	*13.00-14.00*
Shovel turnings	*18.00-19.00*
Cast iron borings	*17.00-18.00*
Cut structurals:	
2 ft and under	40.00-41.00
3 ft and under	37.00-38.00
Heavy turnings	31.00-32.00
Punchings & plate scrap	42.00-43.00
Electric furnace bundles	40.00-41.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	32.00-33.00
Stove plate	32.00-33.00
Unstripped motor blocks	23.00-24.00
Clean auto cast	33.00-34.00
Drop broken machinery	44.00-45.00‡

Railroad Scrap

No. 1 R.R. heavy melt.	39.00-40.00
Rails, 2 ft and under	*49.00-50.00*
Rails, 18 in. and under	*50.00-51.00*
Random rails	*44.00-45.00*
Angles, splice bars	43.00-44.00
Railroad specialties	44.00-45.00
Rails, rerolling	58.00-59.00

Stainless Steel Scrap

18-8 bundles & solids	190.00-195.00
18-8 turnings	115.00-120.00
430 bundles & solids	90.00-95.00
410 turnings	55.00-60.00

CHICAGO

No. 1 hvy melt., indus.	32.00-33.00
No. 1 hvy melt., dealer	30.00-31.00
No. 2 hvy melting	27.00-28.00
No. 1 factory bundles	35.00-36.00
No. 1 dealer bundles	31.00-32.00
No. 2 bundles	22.00-23.00
No. 1 busheling, indus.	32.00-33.00
No. 1 busheling, dealer	30.00-31.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	38.00-39.00
Punchings & plate scrap	40.00-41.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Stove plate	33.00-34.00
Unstripped motor blocks	31.00-32.00
Clean auto cast	44.00-45.00
Drop broken machinery	44.00-45.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00
R.R. malleable	44.00-45.00
Rails, 2 ft and under	48.00-49.00
Rails, 18 in. and under	50.00-51.00
Angles, splice bars	42.00-43.00
Axles	54.00-55.00
Rails, rerolling	57.00-58.00

Stainless Steel Scrap

18-8 bundles, solids	*165.00-170.00*
18-8 turnings	*95.00-100.00*
430 bundles & solids	80.00-85.00
430 turnings	45.00-50.00

BUFFALO

No. 1 heavy melting	29.00-30.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	29.00-30.00
No. 2 bundles	23.00-24.00
No. 1 busheling	31.00-32.00
Shovel turnings	17.00-18.00
Machine shop turnings	12.00-13.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	37.00-38.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	38.00-39.00
No. 1 machinery	45.00-46.00

Railroad Scrap

Rails, random lengths	40.00-41.00
Rails, 3 ft and under	46.00-47.00
Railroad specialties	39.00-40.00
Rails, rerolling	*60.00-61.00*

CLEVELAND

No. 1 heavy melting	*30.00-31.00*
No. 2 heavy melting	22.00-23.00
No. 1 factory bundles	37.00-38.00
No. 1 bundles	*31.00-32.00*
No. 2 bundles	19.00-20.00
No. 1 busheling	*31.00-32.00*
Machine shop turnings	15.00-16.00
Shovel turnings	19.00-20.00
Mixed borings, turnings	19.00-20.00
Cast iron borings	19.00-20.00
Cut foundry steel	32.00-33.00
Cut structurals, plate 2 ft and under	36.00-37.00
Low phos. punchings & plate	*32.00-33.00*
Alloy free, short shovel turnings	20.00-21.00
Electric furnace bundles	*32.00-33.00*

Cast Iron Grades

No. 1 cupola	37.00-38.00
Charging box cast	26.00-27.00
Heavy breakable cast	26.00-27.00
Stove plate	34.00-35.00
Unstripped motor blocks	27.00-28.00
Brake shoes	37.00-38.00
Clean auto cast	39.00-40.00
Burnt cast	30.00-31.00
Drop broken machinery	45.00-46.00

Railroad Scrap

R.R. malleable	48.00-49.00
Rails, 2 ft and under	46.00-47.00
Rails, random lengths	43.00-44.00
Rails, 18 in. and under	48.00-49.00
Cast steel	37.00-38.00
No. 1 railroad cast	44.00-45.00
Railroad specialties	*41.00-42.00*
Angles, splice bars	*40.00-41.00*
Rails, rerolling	*50.00-51.00*

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	155.00-160.00
18-8 turnings	85.00-90.00
430 clips, bundles, solids	80.00-85.00
430 turnings	15.00-25.00†

YOUNGSTOWN

No. 1 heavy melting	*33.00-34.00*
No. 2 heavy melting	23.00-24.00†
No. 1 busheling	*34.00-35.00*
No. 1 bundles	*34.00-35.00*
No. 2 bundles	21.00-22.00
Machine shop turnings	15.00-16.00
Shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Low phos.	*35.00-36.00*
Electric furnace bundles	*35.00-36.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*34.00-35.00*

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	31.50-32.50
No. 2 heavy melting	25.00-26.00
No. 1 bundles	32.50-33.50
No. 2 bundles	18.00-19.00
No. 1 busheling	31.50-32.50
Machine shop turnings	8.00-9.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	13.00-14.00
Cast iron borings	13.00-14.00
Low phos., 18 in.	40.00-41.00

Cast Iron Grades

No. 1 cupola	*33.00-34.00*
Heavy breakable cast	29.00-30.00
Charging box cast	*32.00-33.00*
Drop broken machinery	45.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	*37.00-38.00*
Rails, 18 in. and under	47.00-48.00
Rails, random lengths	41.00-42.00

DETROIT (Brokers' buying prices)

No. 1 heavy melting	28.00-30.00
No. 2 heavy melting	20.00-21.00
No. 1 bundles	29.00-30.00
No. 2 bundles	21.00-22.00
No. 1 busheling	27.00-28.00
Machine shop turnings	8.00-9.00
Mixed borings, turnings	9.00-10.00
Shovel turnings	11.00-12.00

Cast Iron Grades

No. 1 cupola	30.00-31.00
Mixed cast	28.00-29.00
Heavy breakable	24.00-25.00
Unstripped motor blocks	20.00-21.00
Clean auto cast	37.00-38.00

Stainless Steel Scrap

18-8 bundles & solids	165.00-170.00
18-8 turnings	70.00-75.00
430 bundles & solids	65.00-70.00

PHILADELPHIA

No. 1 heavy melting	34.00
No. 2 heavy melting	28.00
No. 1 bundles	36.00
No. 2 bundles	23.00
No. 1 busheling	36.00
Electric furnace bundles	38.00
Mixed borings, turnings	16.00†
Shovel turnings	20.00
Machine shop turnings	13.00†
Heavy turnings	24.00†
Structurals & plates	38.00-39.00
Couplers, springs, wheels	40.00-41.00
Rail crops, 2 ft & under	48.00-50.00

Cast Iron Grades

No. 1 cupola	40.00
Heavy breakable cast	39.00
Drop broken machinery	48.00-49.00
Malleable	48.00†

NEW YORK (Brokers' buying prices)

No. 1 heavy melting	27.00-28.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	27.00-28.00
No. 2 bundles	19.00-20.00
Machine shop turnings	4.50-5.00†
Mixed borings, turnings	5.00-5.50†
Shovel turnings	6.00-7.00†
Low phos. structurals & plates	34.00-35.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	32.00-33.00

Stainless Steel

18-8 sheets, clips, solids	*145.00-150.00*
18-8 borings, turnings	70.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

ST. LOUIS (Brokers' buying prices)

No. 1 heavy melting	31.00
No. 2 heavy melting	*26.00*
No. 1 bundles	*32.00*
No. 2 bundles	22.00
No. 1 busheling	32.00
Machine shop turnings	*13.50*
Shovel turnings	*15.50*

Cast Iron Grades

No. 1 cupola	*35.00*
Charging box cast	33.00
Heavy breakable cast	*32.00*
Unstripped motor blocks	33.00
Clean auto cast	37.00
Stove plate	*30.00*

Railroad Scrap

No. 1 R.R. heavy melt.	35.00
Rails, random lengths	39.00
Rails, rerolling	54.00
Rails, 18 in. and under	43.00
Railroad specialties	39.00
Angles, splice bars	38.00

BIRMINGHAM

No. 1 heavy melting	*33.00-34.00*
No. 2 heavy melting	23.00-24.00
No. 1 bundles	*33.00-34.00*
No. 2 bundles	20.00-21.00
No. 1 busheling	36.00-37.00
Cast iron borings	9.00-10.00
Machine shop turnings	16.00-17.00
Shovel turnings	18.00-19.00
Bar crops and plate	41.00-42.00
Structurals & plate	40.00-41.00
Electric furnace bundles	36.00-37.00
Electric furnace:	
3 ft and under	34.00-35.00
2 ft and under	35.00-36.00

Cast Iron Grades

No. 1 cupola	*38.00-39.00*
Stove plate	*38.00-39.00*
Unstripped motor blocks	29.00-30.00
No. 1 wheels	33.00-34.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00
Rails, rerolling	46.00-47.00
Rails, 2 ft and under	44.00-45.00
Rails, random lengths	40.00-41.00
Angles, splice bars	42.00-43.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	*35.00-36.00*
No. 2 heavy melting	*32.00-33.00*
No. 1 bundles	38.00-39.00
No. 2 bundles	24.00-25.00
Machine shop turnings	12.50-13.00
Crushed turnings	18.00-19.00
Low phos. plate & structurals:	
3 ft	41.00-42.00
2 ft and under	45.00-46.00

Cast Iron Grades

No. 1 cupola	39.00-40.00†
Heavy breakable	25.00-26.00
Foundry malleable	29.00-30.00
Unstripped motor blocks	30.00-31.00

Railroad Scrap

R.R. heavy melt (3 ft)	38.00

LOS ANGELES

No. 1 heavy melting	38.00
No. 2 heavy melting	34.00
No. 1 bundles	35.00
No. 2 bundles	22.00-23.00
No. 2 bundles (export)	23.00-24.00
Machine shop turnings	13.00
Shovel turnings	13.00
Cast iron borings	10.00-12.00
Electric furnace scrap	43.00-45.00

Cast Iron Grades

No. 1 cupola	42.00-43.00

Railroad Scrap

No. 1 R.R. heavy melt.	37.00-38.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	46.00
No. 2 heavy melting	41.00
No. 2 bundles	26.00
Shovel turnings	18.00
Electric furnace	49.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable	35.00
Unstripped motor blocks	33.00
Stove plate (f.o.b. plant)	33.00

SEATTLE (Prepared, f.o.b. car)

No. 1 heavy melting	46.00
No. 1 hvy (unprepared)	41.00
No. 2 heavy melting	41.00
No. 2 hvy (unprepared)	37.00
No. 2 bundles	26.00
Shovel turnings	16.00
Electric furnace	49.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	35.00
Stove plate	33.00
Unstripped motor blocks	33.00

SAN FRANCISCO

No. 1 heavy melting	38.00**
No. 2 heavy melting	33.00**
No. 1 bundles	27.00**
No. 2 bundles	23.00**
Machine shop turnings	15.00
Mixed borings, turnings	15.00
Cast iron borings	15.00
Heavy turnings	15.00
Shovel turnings	15.00

Cast Iron Grades

No. 1 cupola	45.00-46.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

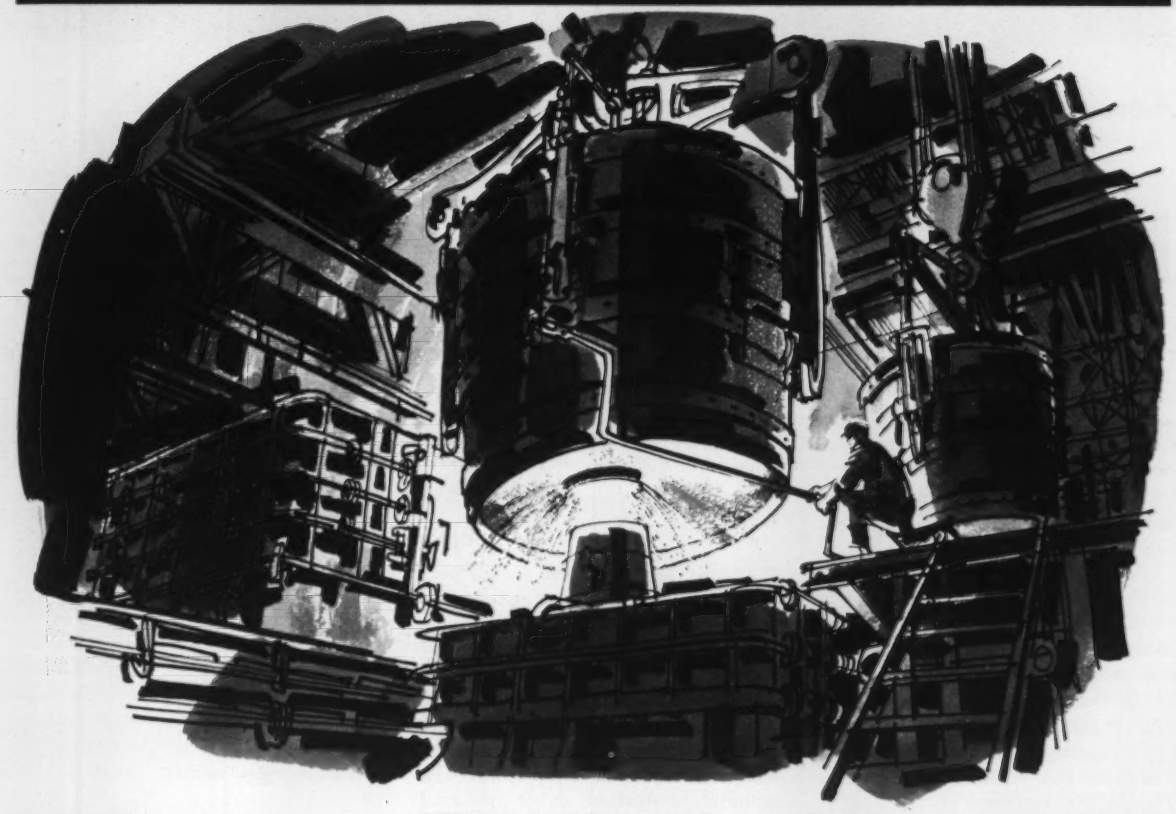
(Brokers' buying prices; net tons)	
No. 1 heavy melting	30.00
No. 2 hvy melt, 2 ft & under	29.00
No. 1 bundles	31.00
No. 2 bundles	23.50
Mixed steel scrap	22.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	30.00
Unprepared	24.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

DANGEROUS INTRUDERS IN IRON AND STEEL



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Nickel is a versatile metal which is used in combination with many other metals to produce a wide range of ferrous and nonferrous alloys. In its pure state, it is used for electroplating and as a catalyst in chemical reactions.

The strength, toughness, corrosion and heat resistant properties which nickel imparts to alloy and stainless steels have established its value to the steel industry.

Nickel may easily be separated from scrap but, since it readily alloys with steel, it cannot be entirely eliminated in the open hearth process. If unintentionally introduced into the furnace, nickel may contaminate the heat of steel in which it is present. It may also leave a residue in the furnace which will be absorbed by successive heats making it necessary for them to be diverted or scrapped.

The presence of nickel is undesirable in high grade silicon sheets or in steel scheduled for deep drawing purposes. In such cases, a valued friend becomes an unwelcome foe.

For scrap of known analysis, our personnel, equipment and strategically located facilities are specifically geared for the purchase or sale of dependably segregated metals. We welcome your inquiry.

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American Zinc's Howard I. Young says . . .

No Zinc Surplus in '61

Nonferrous Metal Prices, Pages 150 & 151

A LEADING zinc industry official takes strong exception to interpretations put on statements emanating from the recent meeting of the International Lead & Zinc Study Group in Geneva.

The official: Howard I. Young, president of American Zinc, Lead & Smelting Co., St. Louis. His objection: He thinks that misleading conclusions pertaining to the U. S. were drawn from the study group's statistical position on zinc.

As reported in STEEL, (Nov. 6, p. 136), the study group forecast that Free World consumption would outrace Free World production both this year and next, but that exports from the Soviet Bloc (and some modest stockpile disposal by the British) would create surpluses. The projected surplus figure for 1962 is 41,000 tons:

Mr. Young sees zinc's supply-consumption position this way: When the U. S. stopped stockpiling zinc in 1957, the Free World was caught with an annual surplus of 250,000 tons, or 10 per cent. But by 1959, points out Mr. Young, metal production had been cut by about 150,000 tons and consumption increased 150,000 tons, so there was actually less production than demand. The deficit was met from producer stocks.

• **Fast Pickup** — This "satisfactory condition" prevailed until early 1960, says Mr. Young, when the U. S. recession sharply hit zinc sales and again brought a surplus. Since the first quarter of this year, demand has been considerably better. Apparent U. S. consumption in the third quarter exceeded both the 1957 and 1959 annual rates, says Mr. Young. "Outside the U. S., Free World consumption in 1961 will be 450,000 tons (30 per cent) above the 1957 rate."

Yet, Free World metal production will be only 100,000 tons above the 1957 rate, and world mine production will be about the same, says Mr. Young. "While stocks in the hands of producers outside the U. S. rose modestly from January to August, they were sharply reduced in September. In recent months, continental and Japanese smelters have had great difficulties obtaining sufficient ores to support their smelter production, and prices of such ores have been bid up sharply."

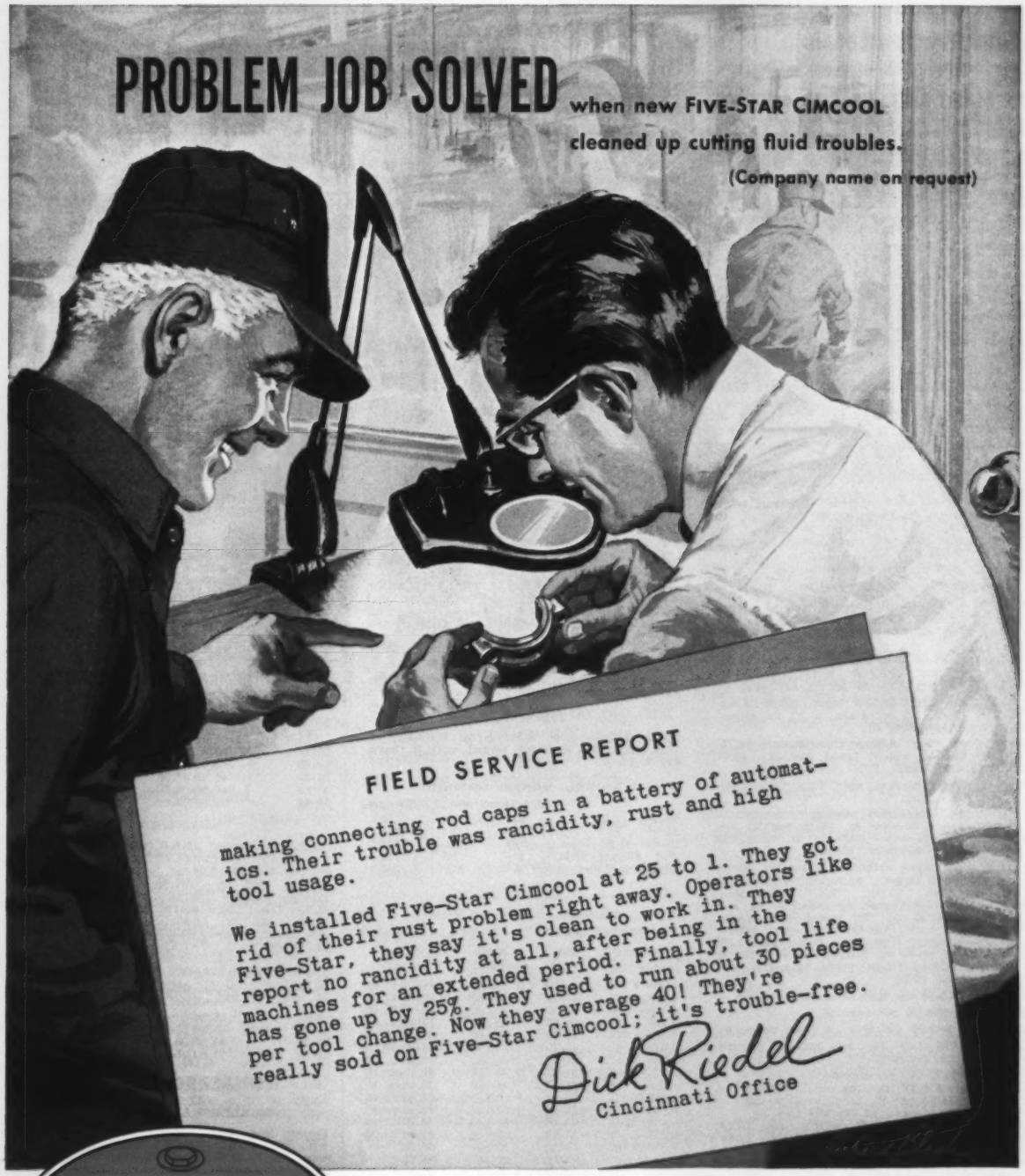
• **U. S. Stocks Tumble**—Here at home, producer stocks have fallen steadily. October marked the seventh straight month they've gone down. At the end of the first quarter, stocks had jumped to 222,889 tons. As this month started, they were down to 150,083 tons, reports American Zinc Institute Inc.

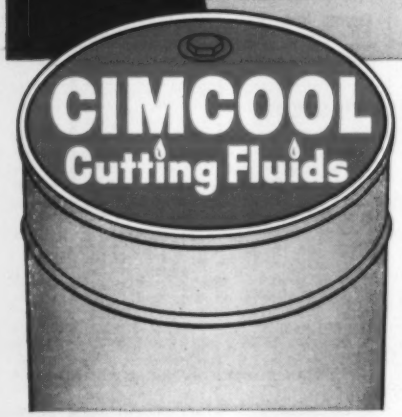
In this quarter, Free World consumption of zinc will rise to an all-time high, believes Mr. Young. He says that while the study group found a supply surplus in 1961, all the surplus was in the first half, none in the second. Also, he says, the study group found there would be no zinc surplus in the first half of 1962. Continues Mr. Young: "True, a small surplus for the second half of 1962 was predicted, but estimates made a year in advance are not likely to be too accurate."

• **Less Optimistic**—Another zinc executive is not quite so encouraged. Charles E. Schwab, president of Bunker Hill Co., fears that the Small Producer Subsidy Act passed by Congress shortly before it adjourned may substantially hike U. S. production of lead and zinc next year. He terms zinc and lead prices "chaotic" and says the low levels are mainly caused by imports flooding the domestic market.

• **Problems for Lead** — Certainly lead is in bad shape. Si Wakesberg, secretary of the Metals Division of the National Association of Secondary Materials Industries and a veteran observer of the metals field, spells out the factors that have weakened the lead market: "A decline in consumption in the U. S. market; increased sales of the metal by Soviet Bloc countries; the wide spread between the U. S. price and the quotation on the London Metal Exchange; reports of discount selling by some U. S. sellers to meet foreign competition; the statistical position which showed rising stocks, higher output, and lower demand."

Not even two price cuts in the domestic price in the last three weeks have helped much. The latest one —another 0.5 a pound on Nov. 13—took the quotation to 10 cents. "At that price, some of the smaller facilities may have to shut down," comments one observer.


PROBLEM JOB SOLVED when new FIVE-STAR CIMCOOL cleaned up cutting fluid troubles.
(Company name on request)
FIELD SERVICE REPORT
making connecting rod caps in a battery of automatics. Their trouble was rancidity, rust and high tool usage.
We installed Five-Star Cimcool at 25 to 1. They got rid of their rust problem right away. Operators like Five-Star, they say it's clean to work in. They report no rancidity at all, after being in the machines for an extended period. Finally, tool life has gone up by 25%. They used to run about 30 pieces per tool change. Now they average 40! They're really sold on Five-Star Cimcool; it's trouble-free.
Dick Riedel
Cincinnati Office



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PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 30 and 50 lb ingots, 24.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.20; No. 43, 25.30; No. 195, 26.70; No. 214, 28.10; No. 356, 26.00, 30 and 50 lb ingots.

Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $40 per lb and up nom.

Copper: Electrolytic, 31.00 deld; custom smelters, 31.00 nom; lake, 31.00 deld; fire refined, 30.75.

Germanium: Purified, ingots, less than 1 kg 37.50 per gram; 1-10 kg 32.00 per gram; 10 kg or more, 29.95 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 9.80; chemical, 9.90; corroding, 9.90; St. Louis. New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld; 24-99 lb, $9.50; 100-449 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $188-191 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $3.15 per lb, depending on quantity; 5000 lb or more, $3 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 81.25; 10-lb pig, unpacked, 89.00; "XX" nickel shot, 88.75; "F" nickel shot for addition to cast iron, in kegs, 81.75; "F" nickel, 5 lb ingots, 82.75. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.09. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 77.50.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $5.25 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot, 123.125; prompt, 123.00.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max), $1.37 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.25.

Zinc: Prime Western, 11.50; brass special 11.70; intermediate, 11.70, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 12.35; special high grade, 12.50 deld. Diecasting alloy ingot No. 3, 13.75; No. 2, 14.25; No. 5, 14.00 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $7.25-7.75 per lb; 100-500 lb, $6.75-7.25 per lb; 500-1000 lb, $6.25-6.75; over 1000 lb, $6.25 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.00; No. 12 foundry alloy (No. 2 grade), 21.25; 5% silicon alloy, 0.60 Cu max, 23.00; 13 alloy, 0.60 Cu max, 23.00; 195 alloy, 24.25; 108 alloy, 21.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 22.75; grade 2, 21.50; grade 3, 20.50; grade 4, 19.50.

Brass Ingot: Red brass, No. 115, 32.00; tin bronze, No. 225, 41.25; No. 245, 35.75; high leaded tin bronze, No. 305, 36.00; No. 1 yellow, No. 405, 27.50; manganese bronze, No. 421, 31.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.98, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.98, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 36.35; l.c.l., 36.98. Weatherproof 20,000-lb lots, 37.05; l.c.l., 37.80.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $15.50 per cwt; pipe, full coils, $15.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheets and strip, $5.70-15.50; sheared mill plate, $4.45-9.00; wire, $5.00-9.50; forging billets, $3.00-4.75; hot-rolled and forged bars, $3.39-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $11.00-16.00; H.R. strip, $11.00-15.00; C.R. strip, $13.00-18.00; forged or H.R. bars, $11.00-15.00.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	147	126	145
Strip, C.R.	133	114	145
Plate, H.R.	134	116	133
Rod, Shapes, H.R.	116	96	116
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish,

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.183	24-72	72-180	44.40-47.00
0.183-0.154	24-72	72-180	44.40-47.00
0.154-0.120	24-72	72-180	44.90-47.80
0.120-0.096	24-72	72-180	44.90-47.80
0.096-0.076	24-72	72-180	45.40-49.30
0.076-0.060	24-72	72-180	45.90-50.10
0.060-0.047	24-72	72-180	46.40-51.30
0.047-0.037	24-72	72-180	46.90-52.70
0.037-0.030	24-72	72-180	47.40-54.30
0.030-0.023	24-60	72-180	47.90-56.10
0.023-0.018	24-48	72-144	48.40-56.40
0.018-0.014	24-48	72-144	50.20-57.00
0.014-0.011	24-48	72-144	52.50-59.00
0.011-0.0085	24-36	72-96	55.20
0.0085-0.007	24-36	72-96	58.20
0.007-0.006	24-36	72-96	61.00

ALUMINUM (continued)

Plates: 1100, 3003, and 5005, mill finish, 0, H12, and H14 tempers, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
3.000-2.000	6-144	72-240	45.10-50.00
2.000-1.251	6-144	72-240	45.50-50.30
1.251-0.751	6-144	72-240	44.50-49.80
0.751-0.250	6-144	72-240	44.50-49.80

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	76.30	....	....
0.188	63.20	62.20	....	79.10
0.250	60.00	61.60	72.70	73.10
0.375	59.20	62.80	71.00	71.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	62.80	71.00	71.00
0.625	59.20	62.80	67.80	66.90
0.750	57.70	61.00	61.60	62.80
0.875	57.70	61.00	61.60	62.80
1.000	57.70	61.00	61.60	62.80
1.125	55.30	58.50	59.50	60.50
1.375	55.30	58.50	59.50	60.50
1.500	55.30	58.50	59.50	60.50
1.625	53.00	56.70	....	58.30
1.750	53.00	56.70	58.30	58.30
1.875	53.00	55.70	....	58.80
2.000	53.00	55.70	58.30	58.30
2.250	51.50	54.00	....	58.30
2.500	51.50	54.00	....	58.30
2.750	49.90	52.20	....	58.30
3.000	49.00	52.20	....	58.30
3.250	....	52.20	....	....
3.375	....	52.20	....	....

Selected sizes.

Forging Stock: Rounds, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 45.50-55.60; 6061, 41.50-55.60; 7075, 56.50-64.60; 7079, 58.50-66.60.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes, 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Extruded Solid Shapes

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.00
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .062 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. width: .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.75-24.25; No. 2 heavy copper and wire, 21.75-22.25; light copper, 19.00-19.50; No. 1 composition red brass, 21.00-21.50; No. 1

BRASS MILL PRICES

MILL PRODUCTS a

(Copper or Copper Alloy No.)	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes
Copper (110)	56.13b	50.36-51.36	....	57.32
Yellow Brass (268, 270)	49.27	35.77c	49.56	53.43
Low Brass, 80% (240)	52.15	52.09	52.44	56.21
Red Brass, 85% (230)	53.17	53.11	53.46	57.23
Com. Bronze, 90% (220)	54.73	54.67	55.02	58.54
Manganese Bronze (675)	57.69	51.27	61.54	....
Muntz Metal (365)	51.94	47.25	....	....
Naval Brass (464)	53.94	47.75	60.25	58.10
Silicon Brass (651)	61.39	60.58	60.68	79.80
Nickel Silver, 10% (745)	65.56	67.16	66.91	....
Phos. Bronze, A-5% (510)	76.97	77.47	76.72	78.90

SCRAP ALLOWANCES d (Based on copper at 31.00c)

Clean Heavy	Rod Ends	Clean Turnings
27.00	27.00	26.25
20.375	19.50c	18.50c
22.875	22.625	22.125
23.875	23.625	23.125
24.75	24.50	24.00
19.25	19.00	18.50
19.125	18.875	18.375
19.00	18.75	18.25
26.50	26.25	25.75
26.00	25.75	13.00
28.50	28.25	27.25

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Free cutting. d. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 20.00-20.50; new brass clippings, 16.00-16.50; light brass, 13.00-13.50; heavy yellow brass, 14.00-14.50; new brass rod ends, 15.00-15.50; auto radiators, unsweated, 17.00-17.50; cocks and faucets, 17.25-17.75; brass pipe, 16.00-16.50.

Lead: Soft scrap lead, 6.75-7.00; battery plates, 2.50-2.75; linotype and stereotype, 8.00-8.50; electrotype, 7.50-7.75; mixed babbitt, 10.00-10.50.

Monel: Clippings, 26.00-26.50; old sheets, 25.00-25.50; turnings, 18.50-19.00; rods, 25.00-25.50.

Nickel: Sheets and clips, 56.00-58.00; rolled anodes, 56.00-58.00; turnings, 43.00; rod ends, 56.00-58.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 3.00-3.25; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 8.50-9.00; clean borings and turnings, 3.00-3.50; segregated high copper clips, 9.25-9.75; mixed low copper clips, 9.75-10.25; mixed high copper clips, 9.25-9.75.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 8.50-9.00; clean borings and turnings, 7.00-7.50; segregated low copper clips, 14.00-14.50; segregated high copper clips, 12.50-13.50; mixed low copper clips, 12.00-13.00; mixed high copper clips, 11.00-12.00.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 9.75; clean borings and turnings, 8.50; segregated low copper clips, 13.00; segregated high copper clips, 12.25; mixed low copper clips, 12.50; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 57.00; light scrap, 52.00; turnings and borings, 37.00.

Copper and Brass: No. 1 heavy copper and wire, 26.50; No. 2 heavy copper and wire, 24.75; light copper, 22.50; refinery brass (60% copper) dry copper content, 23.25-23.50.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 26.50; No. 2 heavy copper and wire, 24.75; light copper, 22.50; No. 1 composition borings, 23.50; No. 1 composition solids, 24.00; heavy yellow brass solids, 24.50; yellow brass turnings, 15.50; radiators, 20.00.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.50; oval, 44.50; electrodeposited, 37.50; cast, 42.50, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 117.50; 500-1999 lb, 110.50; 2000-4999 lb, 107.00; 5000-29,999 lb, 106.00; 30,000 lb, 105.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 141.50; 200-499 lb, 140.00; 500-999 lb, 139.50; 1000 lb or more, 139.00.

Zinc: Balls, 18.25; flat tops, 18.25; flats, 21.00; ovals, 20.85, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chrome Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.5; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cynide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.50; 2000-5000 lb, 13.50; 6000-11,900 lb, 13.25; 12,000-22,900 lb, 13.00; 23,000 lb or more, 12.50.

Nickel-Chloride: 100 lb, 47.50; 200 lb, 45.50; 300 lb, 44.50; 500-4900 lb, 42.50; 500-9900 lb, 40.50; 10,000 lb or more, 39.50.

Nickel Sulphate: 5000-22,999 lb, 31.00; 23,000-39,900 bl, 30.50; 40,000 lb or more, 30.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 89.60; 100-600 lb, 79.90; 700-1900 lb, 77.20; 2000-9990 lb, 75.30; 10,000 lb or more, 74.00.

Stannous Chloride (Anhydrous): 100 lb, 149.00; 400 lb, 139.00; 800-19,000 lb, 177.70; 20,000 lb or more, 118.50.

Stannous Sulphate: Less than 50 lb, 156.30; 50 lb, 126.30; 100-1900 lb, 124.30; 2000 lb or more, 122.30.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(Concluded from Page 145)

to mouth. Jobbing foundries are buying a little more actively; pressure pipe fabricators continue to order fair tonnages; but soil pipe fabricators have reduced their specifications.

Merchant iron producers have comfortable reserve stocks.

Imports of iron are light, but fair stocks have accumulated on docks. Imports are offered at prices under the domestic market.

Primary Aluminum Output Reduced at Kaiser Plant

Primary aluminum production of Kaiser Aluminum & Chemical Corp., Oakland, Calif., has been curtailed to 86 per cent of capacity because Kaiser's metal inventories have been built to a level consistent with current sales. The curtailment, at the Mead, Wash., plant, affected about 135 workmen.

The company's primary aluminum output has risen steadily since March, when the annual production rate had dipped below 60 per cent of capacity. The 86 per cent rate now in effect will keep the company's operations at a higher level than during the first half of the year.

Kaiser is introducing a new line of aluminum building products for residential construction. The first item is clapboard siding, available with or without insulation backing. Production starts early next year.

In 1960, nearly 340 million sq ft of aluminum siding was applied to new and old homes in the U. S. That amounted to about 170 million lb of aluminum sheets, an increase of nearly 200 per cent in the last four years.

G. D. Birla, Indian industrialist, plans to discuss with Edgar J. Kaiser, chairman of the Kaiser company, plans for expansion of an aluminum plant Birla operates in India. Between $35 million and $40 million will be expended on the expansion, plus an additional $10 million for a fabricating works.

Structural Shapes . . .

Structural Shape Prices, Page 134

A 37-day strike that tied up $50 million worth of construction projects in northern Ohio was settled last week. The dispute had halted work on 125 projects.

About 600 members of the ironworkers' union were affected and more than 1200 members of other building trades had been laid off. Fabricating shop operations were seriously hampered and steel piled up in yards.

Public work continues to dominate the structural market over the country. While demand is easing seasonally, considerable work is still being figured. Most fabricators are in fairly comfortable inventory position as the cold weather approaches.

Bridge tonnage has sustained fabricated structural steel demand in New England, but it is easing. Vermont has plans for 3035 tons up for site inspection and later estimating, and Connecticut closes Nov. 27 on two bridge contracts.

Fabricating plants are not buying steel actively. They are covering on firm commitments.

Efforts to firm fabricated structural steel prices are meeting with mediocre success.

Bonneville Power Administration, Portland, Oreg., has called bids Dec. 5 on 3000 tons of miscellaneous tower steel for delivery in Washington and Oregon.

California's San Mateo-Hayward Bridge near San Francisco, will undergo a major remodeling, costing possibly $65 million. A high level, double decked, fixed span structure is proposed.

The California Department of Public Works' requests for bids on highway projects within the state have averaged close to $35 million a month so far this year.

CLASSIFIED

Help Wanted

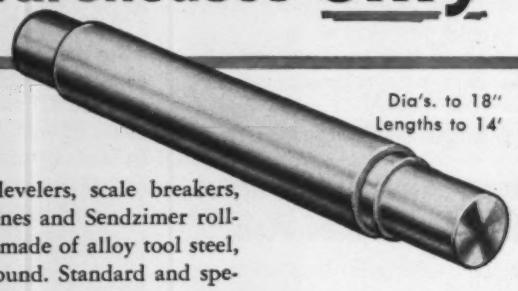
MANUFACTURERS' AGENTS—Wanted by Steel and Alloy Plate Fabricator of pressure vessels, tanks, weldments and general custom fabrication. A profitable line for representatives calling on Industrial, Engineering and Construction accounts. Reply Box 975, STEEL, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED RATES

All classifications other than "Position Wanted" set solid, 50 words or less $20.00, each additional word, .40; all capitals, 50 words or less $23.00, each additional word .50; all capitals leaded, 50 words or less $28.00, each additional word .65. "Position Wanted" set solid, 25 words or less $5.50, each additional word .22; all capitals 25 words or less $7.50, each additional word .29; all capitals leaded 25 words or less $9.00, each additional word .35. Keyed address takes seven words. Cash with order necessary on "Position Wanted" advertisements. Replies forwarded without charge. Displayed classified rates on request. Address your copy and instructions to STEEL, Penton Building, Cleveland 13, Ohio.

For STEEL MILLS

and warehouses *only*



"HILL ACME" ROLLS

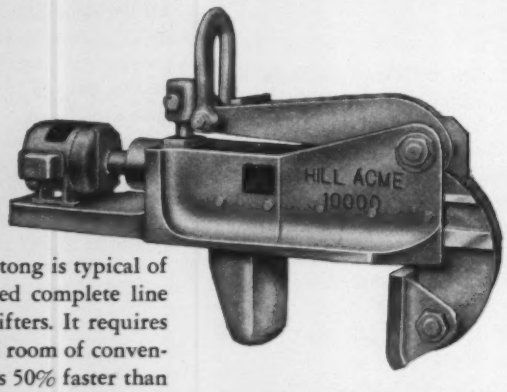
Dia's. to 18"
Lengths to 14'

Custom made for levelers, scale breakers, straightening machines and Sendzimer rolling mills. Precision made of alloy tool steel, heat treated and ground. Standard and special types.

"CLEVELAND" METAL CUTTING KNIVES

The product of forty years of experience in manufacturing alloy grade, metal cutting knives of all types for shearing hot and cold metals.

"HILL ACME" MOTORIZED LIFTERS



This vertical coil tong is typical of the newly designed complete line of HILL ACME lifters. It requires only 1/3 the head room of conventional tongs and is 50% faster than mechanical types. Gives a constant grip ratio regardless of wall thickness and can be prepositioned to eliminate damage to the coil. Available up to 80,000 lbs. capacity. Contact us for "C" hooks, Rack Lifters, Billet, Sheet, Plate, Bar, Ingot and Ingot Mould Lifters.

THE HILL ACME COMPANY

1201 West 65th Street • Cleveland 2, Ohio

MANUFACTURERS OF: "HILL" Grinding and Polishing Machines • "ACME" Forging Machines • "CANTON" Rotary and Alligator Shears • BAR-BILLET Shears MATERIAL HANDLING Equipment • "CLEVELAND" Knives and Shear Blades.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

13,500 tons, bridge superstructure, Ohio River, North-South Expressway, Louisville, Ky.-Jeffersonville, Ind., to Allied Structural Steel Co., Chicago.

10,000 tons, 43 story office building, Carol Management Corp., 90 Park Ave., New York, to Grand Iron Works, New York.

5100 tons, Staten Island approach, Verrazano-Narrows Bridge, Triborough Bridge & Tunnel Authority, New York, through Slattery Construction Co. to Bethlehem Steel Co., Bethlehem, Pa.

4600 tons, state buildings No. 8-8A, Albany, N. Y., Depot Construction Co., New York, awarded general contract.

1126 tons, nine state bridges, project U-348-14, Gardner, Mass., to Haarmann Steel Co., Holyoke, Mass.; Bayer & Mingolla Construction Co. Inc., Worcester, Mass., general contractor.

1000 tons, Locust Valley High School, Locust Valley, N. Y., to Bethlehem Fabricators, Bethlehem, Pa.

1000 tons, office building, General Foods Corp., White Plains, N. Y., to Grand Iron Works, New York.

700 tons, Eastern Shopping Center, Broome County, New York, to Grand Iron Works, New York.

STRUCTURAL STEEL PENDING

4000 tons, including six span structure, 63-137, Hartford, Conn., and three, 2 span rolled beam, and two, single span rigid frame bridges, 63-136, Hartford; bids Nov. 27.

3055 tons, bridge structures, mostly composite and multiple wide flange beam, Vermont; plans ready for site inspection and estimating early in 1962.

3000 tons, miscellaneous tower steel, Schedule No. 9378, delivery to four Washington and Oregon points; bids to Bonneville Power Administration, Portland, Oreg., Dec. 5.

1600 tons, Trinity River, California, power project; Tower City Construction Co., Spokane, Wash., low bidder to the U. S. Bureau of Reclamation.

1600 tons, state bridgework, Lackawanna County, Pennsylvania; Reed & Kuhn, Elysburg, Pa., low on the general contract; also, 729 tons of reinforcing bars required.

1089 tons, four contracts, including partial setaside tonnage, angles, Military Industrial Supply Agency, Navy, Philadelphia; bids in.

1000 tons, state bridgework, Carbon County, Pennsylvania; J. Robert Dazley Inc., Pottsville, Pa., low on the general contract.

750 tons, Belmont filter plant, Philadelphia; Malan Construction Co., New York, awarded the general contract.

570 tons, A F of L Hospital, Philadelphia; the Wark Co., Philadelphia, is low bidder on the general contract.

500 tons, addition, Lenox Hill Hospital, New York; Psaty & Fuhrman, low on the general contract.

217 tons, state bridgework, Route L. R. 100r (4-5) Luzerne County, Pennsylvania, bids Nov. 30; 285 tons of reinforcing bars also required.

REINFORCING BARS . . .

REINFORCING BARS PENDING

1050 tons, Walnut Creek channel, part 3, Covina, Calif.; bids Jan. 22 to the U. S. Engineer, Los Angeles.

800 tons, San Dimas wash channel, part 3, Los Angeles County Drainage Area; bids Jan. 10 to the U. S. Engineer, Los Angeles.

729 tons, state bridgework, Lackawanna County, Pennsylvania; Reed & Kuhn, Elysburg, Pa., low on the general contract; 1600 tons of shapes also required.

400 tons, Washington State, Roanoke St. Expressway, Seattle; bids to Olympia, Wash., Nov. 28.

385 tons, distribution warehouse, Western Electric Co., King of Prussia, Pa., Wark Co., Philadelphia, general contractor; structural work for this contract was recently awarded to the Belmont Iron Works, Eddystone, Pa.

285 tons, state bridgework, Route L. R. 1005 (4-5), Luzerne County, Pennsylvania, bids Nov. 30; 217 tons of shapes also required.

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Coming

Nov. 27

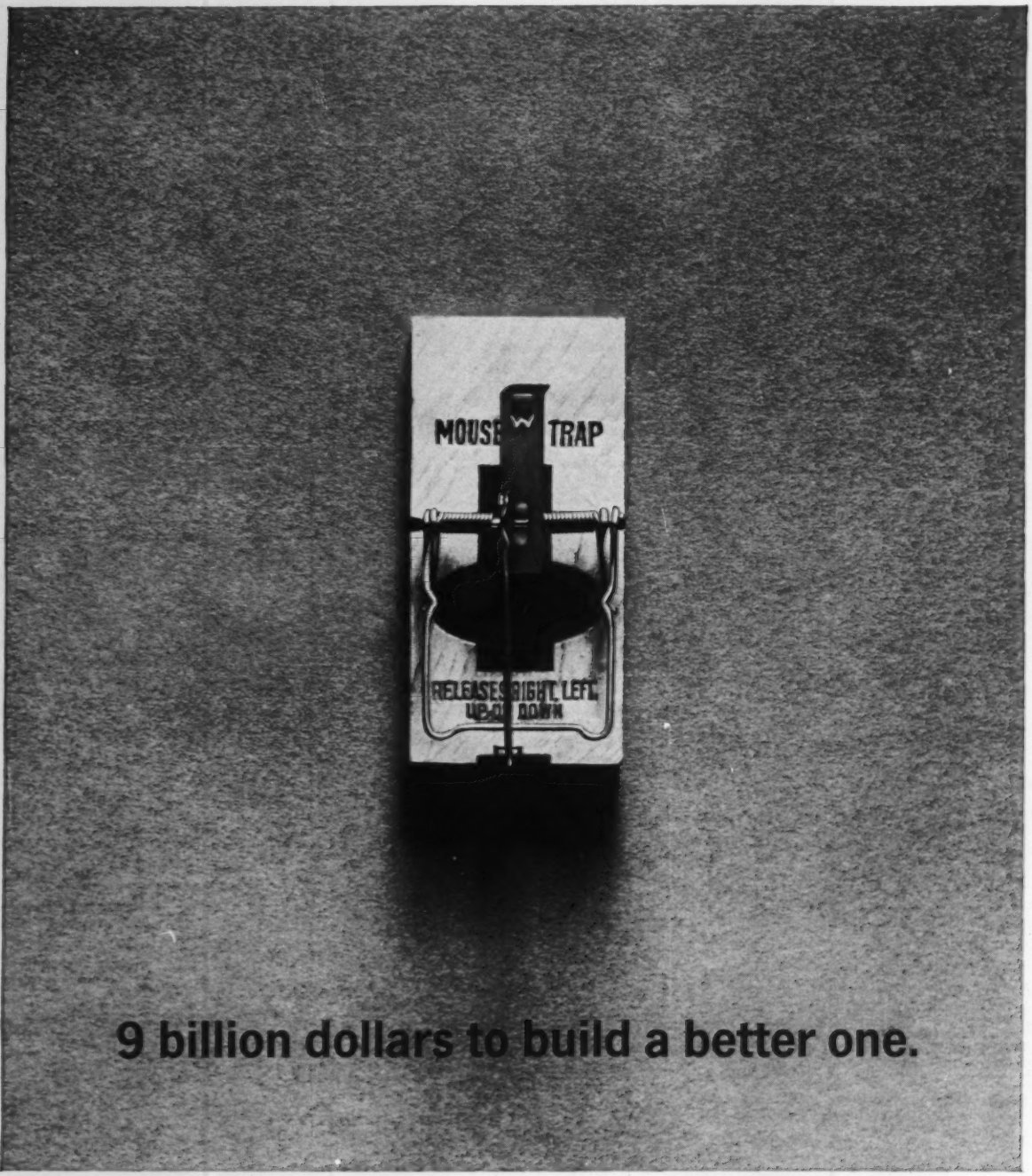
IN

STEEL

What Managers Expect in 1962

Metalworking executives are conservatively optimistic about business prospects next year. But to get the full story, check next week's STEEL for a concise summary.

Some 5000 managers were asked to foretell at what rate their plants will operate in 1962. They have been making these forecasts for STEEL since World War II, and their past performances have established a remarkable record for precision. With one exception, they have accurately predicted the direction of the business trend every year. The exception occurred in 1958 when many crystal balls were shattered.



9 billion dollars to build a better one.

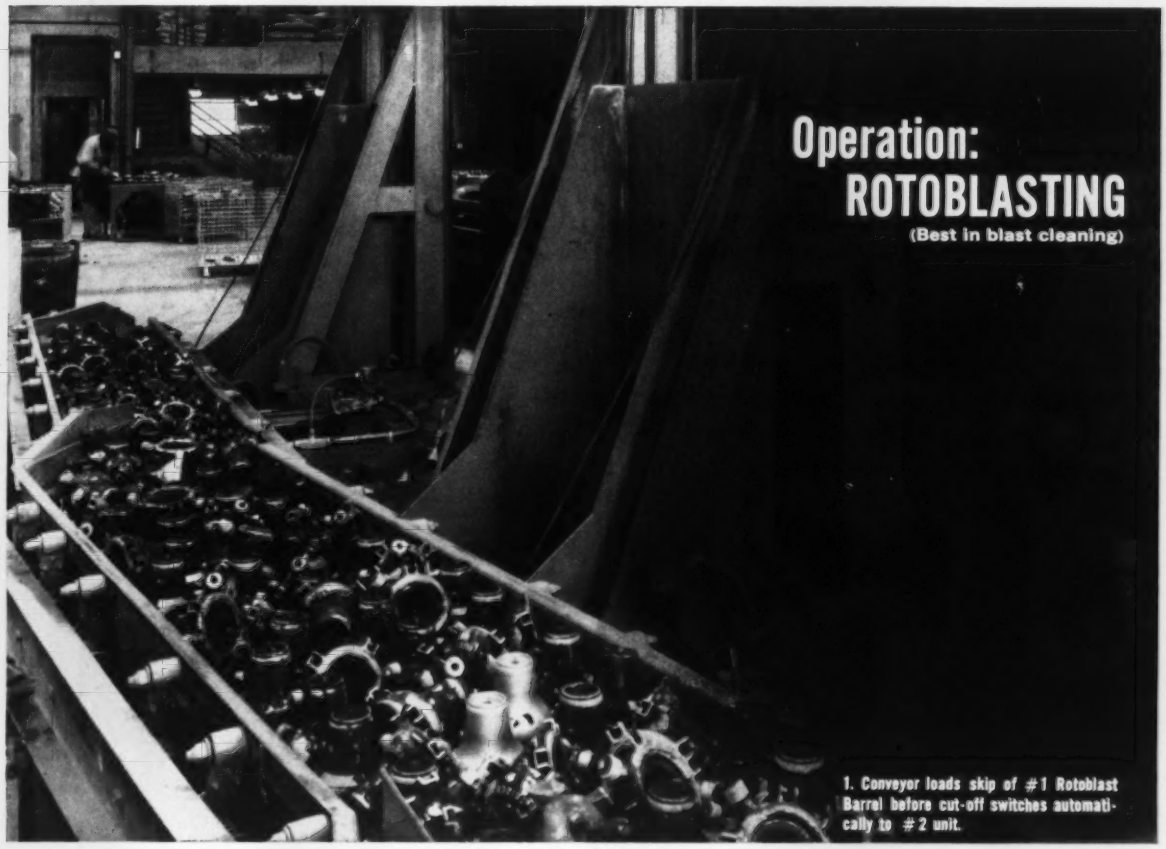
We're living in a needing, buying, growing America—a time for new and improved products and services—the creation of new jobs. More than ever, a businessman with an idea, with the urge for something better will move ahead with our expanding economy.

But after the idea, what follows can be a costly period of research and development. Not necessarily—if you use the immense 9-billion-dollar fund of research and patent information that's available at your U.S. Department of Commerce. Think of the saving—in time and money.

For example: there are reports on extensive research by your Government in new products and processes. A translation of data on inventions and discoveries abroad—information on over 3 million patents—a fortune in patents owned by your Government. All this is yours—for your use and your benefit.

Take advantage of the many ways in which your business can grow. In developing new products and services. In the lucrative foreign markets. In new U.S. markets. In attracting new industry to your local community. Just phone or write the U.S. Department of Commerce Office of Field Services in your city, or Washington 25, D.C. Your U.S. Department of Commerce is always ready to help you grow with America!

NOW'S THE TIME TO GET GROWING IN A GROWING AMERICA



Operation: ROTOBLASTING

(Best in blast cleaning)

1. Conveyor loads skip of #1 Rotoblast Barrel before cut-off switches automatically to #2 unit.

Complete automation in blast cleaning!

Pangborn Rotoblast removes heavy sand cores and cleans up to 45,000 castings per shift at Neptune Meter!

A new and *completely automatic* Rotoblast operation not only cleans castings in half the time, but a new special separation removes heavy sand cores as well at Neptune Meter Co., Long Island City. The world's largest exclusive manufacturer of meters for liquids, Neptune can now handle 45,000 castings from the molds each shift . . . with just two automated Rotoblast Barrels.

No costly or time-consuming manual lifting, toting or weighing here! Once the button is pressed, the Rotoblast sequence starts and recycles automatically until stopped at the end of the shift!

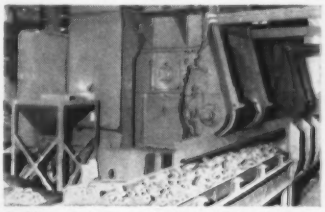
Whether your installation features automation or batch cleaning, Rotoblast cleaning efficiency can cut *your* operating and manpower costs. Flexibility of installation, ease of maintenance, durable construction—all contribute to lower overall cleaning costs.

Write PANGBORN CORPORATION, 1600 Pangborn Blvd., Hagerstown, Md., Pangborn Canada, Ltd., 47 Shaft Road, Toronto (Rexdale), Canada; or phone district office in Yellow Pages, "Sand Blast Equipment." *Manufacturers of Blast Cleaning, Vibratory Finishing, Dust and Fume Control Equipment—Rotoblast® Steel Shot and Grit®.*

Pangborn

OF HAGERSTOWN

2. Skip fills second unit with exact pre-determined load for cleaning.



3. Cleaned castings move on take-away conveyor to next operation.

4. Before and after Rotoblasting. Note core sand and rods in uncleaned piece.

THE INGERSOLL MILLING MACHINE COMPANY ROCKFORD, ILLINOIS

IN MANY WAYS, *IN MANY PLACES . . .*
special Ingersolls help to reduce costs, increase profits.

Euclid Crawler Tractors help their owners beat the profit squeeze by cutting operating costs to a new low. One of the most important ingredients of profits in building Euclid C-6 Crawler Tractors is the accuracy and precision with which their rugged track links are machined.

The seven-station special Ingersoll pictured here bores and chamfers, drills, reams and broaches heat-treated links uniformly to the exacting tolerances required for the severely rugged work the Crawlers do in moving earth, rock, coal or ore. Doing the work formerly done on five machines, this machine reduces the direct cost of producing track links because it machines them more accurately and faster than former methods.

Less easily evaluated are these other important gains: Handling time is reduced because all of the work is done on one machine, with one setting. Work-in-process inventory is reduced. And above all, the steady flow of parts to the assembly floor contributes to production line efficiency and economy.